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ANNALS

OF

ANATOMY AND SURGERY.

THE PATHOLOGY, SYMPTOMS AND DIAGNOSIS OF ANKLE-JOINT DISEASE.[1]

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THE ankle-joint, no less than the, generally considered, more important articulations at the knee and hip, plays an important part in the mechanism of locomotion. Situated at the distal part of the lower extremity, it forms the basis upon which the whole weight of the body rests during the act of walking, and we may justly admire the mechanism which Nature has provided to render this articulation at once so compact and so strong.

As we shall direct our attention, principally, to the ankle-joint itself—rather than to the foot as a whole—we will, at once, proceed to a consideration of the articulation. This joint belongs to the class Diarthrosis, and to the subdivision

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[1] A lecture delivered at the New York Orthopædic Dispensary and Hospital November 3, 1881.

Ginglymus. In other words, the ankle is a hinge-joint, and the great accuracy with which the bones are adapted to each other, is one great element of its strength. It is formed by the junction of the distal ends of the tibia and fibula, with the upper and two lateral surfaces of the astragalus. The fibula forms only a minor part of the joint articulating only with the outer side of the astragalus, and its distal end forms the outer malleolus. The tibia, on the contrary, presents a large articulating surface, and its promiinent process forms the internal malleolus. These two bones then form a sort of archway, irregular in shape. They are bound together by ligaments, and this union is so strong that, as is well-known, a fracture of the bones themselves is much more frequent than a laceration of the ligaments, which hold them in position. Into this irregular arch, formed by the two malleoli, the astragalus fits with a degree of accuracy which is surprising. And when the foot is placed upon the ground in walking, the astragalus presents a surface over which the tibia and fibula glide, and each astragalus, in turn, bears the entire weight of the body. In conditions where these apposed surfaces are inflamed, this gliding motion is interfered with, and the structure of the tarsal bones and tarsal ligaments does not permit any vicarious action. Indeed, the limp of ankle-joint disease is characteristic, so also is the limp of knee-joint disease, and the "hip limp" is easily recognized. An expert in orthopædy can almost always make a pretty accurate estimate of the location of the lesion before his patient is undressed by the peculiarities of attitude, gait, etc., and these remarks are especially true of certain forms of ankle-joint disease.

The astragalus articulates with the os calcis and the scaphoid. If disease of either of these bones actually involves the astragalus, we find some of the symptoms of ankle-joint disease. But in tarsal disease, *per se*, we see an altogether different train of symptoms. I will not stop here, however, to describe these differences. We will consider them under their proper head.

It is well that we should notice a few anatomical points—as they will have a practical bearing upon some of the questions we shall discuss later. There are four ligaments: the anterior, the posterior, the internal and external lateral. They form together a complete envelope of the joint, and in some instances pass beyond and assist in forming the capsule of some of the tarsal joints. It is stated by some anatomists, and with reason, that the synovial membrane of the ankle-joint is very extensive. It lines all the ligaments just mentioned, and sends a cul-de-sac to the inferior articulation between the tiba and fibula. This synovial sac is supposed to contain a larger quantity of synovia than that of any other in the body. It would certainly seem otherwise, especially when we compare a simple synovitis of the ankle with the same condition at the knee. But it must be remembered that in the former articulation the synovial membrane is held down by these strong ligaments, while in the latter an effusion easily distends the soft, fibrous membrane which covers the easily distensible synovial membrane. In the ankle-joint effusion in the synovial sac shows itself prinpally along the anterior portion of the joint, and under each malleolus. But little impression is made posteriorly, and it has rarely occurred, in my own experience, in a case of uncomplicated synovitis of this articulation, that the fossæ on either side of the tendo Achillis became obliterated. Not unfrequently in extensive disease which involves the whole articulation, these fossæ become lost through an œdematous infiltration. But these cases do not involve the synovial membrane alone. The ligamentous protection is so strong and so complete that nature affords the most excellent means of producing compression. It is not until considerable deposit or distension has occurred in ankle-joint synovial disease that the characteristic bulging is very perceptible. This, with other factors, to be mentioned later, is a reason why chronic fungoid synovitis is not sooner recognized.

It is well that we should stop a moment and consider carefully the bursæ about this articulation. Their number is considerable, and their location is such that it might be very easy to mistake a simple chronic bursitis for a chronic synovitis. I have seen cases where this mistake was made; and when we consider that these bursæ may become quite large from injury or during a process of chronic inflammation, it is not unlikely that the same error will occur again. I have seen a case where two or three contiguous bursæ over the anterior part of the joint become simultaneously affected from injury, and the imitation here was very close, for there was considerable swelling about the entire joint also. There is one bursa each for the tibialis anticus, the extensor longus pollicis, and a third one common to the extensor longus digitorum and peroneus brevis. Behind the external malleolus there is a bursa common to both peroneus longus and brevis. It continues downward on the peroneus longus as far as the sole of the foot. But there is still another in front of the external malleolus; this is the bursa proper to the peroneus brevis. There is another for the flexor longus pollicis. This extends from some distance above the lower end of the tibia to beyond the groove in the sustentaculum tali. There are bursæ also which assist the movement of the muscles over the lower end of the tibia, over the internal lateral ligament; also one over the tibia for the tibialis posticus tendon.

We can readily see, therefore, how a chronic bursitis in certain locations may resemble a synovial effusion or synovial degeneration without effusion, just as we can imagine a suppurating bursitis in the neighborhood of the knee-joint may be called "white swelling." A close study of the symptoms, however, and a careful consideration of the history should enable you to decide in all questionable cases.

All the muscles which *arise* from the tibia and fibula pass *over* the ankle-joint. Two which arise from the condyles of the femur are inserted beyond the ankle. These are the gastrocnemius and plantaris. The former group act directly or indirectly upon the ankle-joint, while the latter possess the power of flexing the leg and extending the foot. Thus, while the peronei, for example, may produce by their contraction a position of valgus, the gastrocnemius may be considerably shortened without apparently causing any equinus if the knee be flexed. So that, in conducting your examinations of the muscular elements of an ankle-joint deformity, whether the case is one of ankle-joint disease or of club-foot, be sure the knee is fully extended. In this way only can the amount of posterior muscular resistance be estimated.

The inner border of the foot is raised and adducted by the tibialis anticus and posticus; the outer border of the foot is raised and abducted by the three peronei. The tibialis anticus and peroneus tertius, acting conjointly, flex the ankle-joint, and the peroneus longus and brevis and tibialis posticus extend the foot. The arch of the foot, though held in position by strong ligaments, is materially supported by the tibialis anticus and the peroneus longus. The flexor longus digitorum and flexor longus pollicis flex the toes to which they are attached, and when this action is completed they assist in extending the ankle. The other extensors and flexors also materially assist the larger muscles in flexing or extending the ankle-joint, though, of course, the calf muscles are the powerful extensors of the articulation.

The fact that the foot is abducted or adducted by certain muscles, has been noted. It must not be thought, however, that these movements take place at the ankle-joint. Being a true hinge-joint, no movement takes place at this articulation but flexion and extension—unless it be placed in a position of extreme extension, and then there is a slight lateral motion. During flexion and extension the foot does not move through a direct antero-posterior plane. The plane upon which motion does occur is "inclined outward and drawn through the foot from the middle of the astragalus to the apposed surfaces of the bases of the second and third metatarsal bones," and consequently there is a slight movement outwards of the foot in flexion, and inwards in extension.

We have thus briefly noticed a few points in the anatomy and mechanism of the ankle-joint (some of which have been taken from Morris's excellent work on the "Anatomy of the Joints") for the reason that in by far the greater number of cases, clinically considered, contraction of some or all of these muscles occur, and the resulting deformity, which by many has been referred directly to changes which take place in the joint itself, is due to disturbances of muscular action. We shall especially consider these conditions later.

The diseases of the ankle-joint which will especially engage our attention to-day are those which can only be described as chronic, and which would be ordinarily grouped under the head of *tumor albus* or white swelling. And they may be described as presenting, at least clinically, a primary lesion of either the synovial membrane or the bone. If chronic synovitis, or osteitis of the ankle-joint, ever has its inception in a primary non-traumatic lesion of the ligaments or cartilage, we have no absolute demonstration of the fact, and from what we know of their structure and functions we may be assured that an idiopathic chronic inflammation of these structures is very rare. The cartilage, especially, in a state of chronic degeneration, would give no sign, and the fibrous structure of the ligaments leads us to look for acute rather than chronic lesions. And, clinically speaking, these conclusions hold good.

A great deal has been written and said concerning the ætiology of chronic joint disease. We have but one opinion upon the subject, and this opinion has been strengthened by daily clinical work in this class of cases, and a study of the pathological conditions discovered. If we accept the story told us by the ankle-joint, we are only strengthened in our view that traumatism plays a very unimportant part in the production of chronic disease. The ankle is peculiarly exposed to violent shocks and twists. It is in almost constant use during the day, and its location is such that great and often unexpected shocks are thrown upon it. We have many sprains of the ankle, and but few, very few, dislocaions. And although the sprain may be very serious, apparently, and ecchymotic areas may be found quite extensive in character, it is very exceptional that we find a chronic joint disease of the fungoid type following such injuries. Almost always some injury is blamed; almost always the relation of cause and effect is associated in the minds of the laity between a slight twist, not followed by any especial trouble, and the retrograde lesion found in chronic joint disease. Eminent authorities take this view also. We have failed to be convinced by their arguments and can only say, as we have expressed ourselves on former occasions, that we deem the development of a typical, chronic fungoid joint lesion, in a perfectly healthy person, almost impossible. We cannot trace the regressive metamorphosis which characterize these conditions—the degenerate abscesses, the flocculent, ichorous discharge, the prolonged dry caries or synovial degeneration—to traumatism alone. It requires a peculiar predisposition, I firmly believe, to make traumatism avoidable as a factor.

Clinically, then, as well as pathologically, we divide the chronic diseases of the ankle into two classes—those which affect the synovial membrane alone, and those which are primarily developed in the bone. Here, as in the knee-joint, the study of joint lesions, clinically speaking, is quite easily pursued, for these joints are superficial, and we can arrange our aids to diagnosis into objective signs and subjective symptoms. Chronic synovitis of the ankle-joint *per se* may exist for a long time without giving any subjective symptoms whatever. Uncomplicated chronic osteitis presents subjective elements of diagnosis almost wholly. It should not be difficult, therefore, to differentiate between the two; and as the treatment to be pursued is wholly different in these two conditions, it is necessary to reach positive conclusions.

You may ask: What are the changes which take place in chronic fungoid synovitis? I answer, briefly, that in the large number of cases the primary changes occur upon the free surface of the membrane, and they are characterized by what the German pathologists call fungous or granular degeneration. I have not time to stop here to enter into a minute detail regarding these changes. They are fully described by Billroth, Volkman, and other writers, and I would advise you to familiarize yourselves with their descriptions. Suffice it to say, that sooner or later this fungous process produces a modification of the synovial fluid. The synovial membrane becomes distended or simply thickened by the gelatinous deposit, but there is no deformity save that which results from the thickened membrane or the distension of the capsule. The membrane presents very few nerves, and they are not highly sensitive. Hence, pain is not complained of, and locomotion is practically uninterfered with. Joint motion remains nearly normal, and unless the swelling of the articulation is noticed and successfully treated, the joint lesion progresses slowly, but none the less surely. But, after a while, pain, limping and real debility of the limb supervene. The symptoms become more urgent, the joint shows a higher temperature, the muscles begin to waste, sleep is disturbed, and the joint becomes almost useless. What do these new symptoms mean? The fungous, proliferating masses have penetrated the nerveless cartilage, and are, as Billroth expresses it, eating their way into the bone. This fungous proliferation attacks the fibrous structure of the bone. It attacks it primarily, leaving the very sensitive nerve filaments exposed to these fungous masses and the bony detritus. The muscular spasm, the muscular atrophy, the pain, the debility of the limb, the nocturnal cry—all these occur in fungous caries, and, in some cases, abscess occurs. In other cases the disease goes on for years, and yet no abscess appears. In many of these cases we have a condition of caries sicca—a condition described with considerable minuteness by the German pathologists, and one which particularly demands our attention; for these cases especially, where the subjective element so strongly preponderates without the objective signs, are sometimes called hysterical, or the limp is ascribed to habit, etc. The objective signs of joint disease, which are so depended upon by many general surgical writers, are wholly wanting. Be on your guard, therefore, in studying joint disease. Apparently easy of diagnosis, these chronic joint lesions have deceived the best surgical talent, and a close study of all the symptoms, and a very deliberate analysis of all the elements of diagnosis—including all the methods of precision applicable to this class of cases—is necessary to the correct understanding of the conditions met with in even chronic disease of the ankle-joint. Be careful in obtaining the history; omit no point that gives you a clue; follow up every suggestion which any symptom presents; and, in many instances, you will, to say the least, be surprised at the clinical picture which will result.

In making a diagnosis of chronic ankle-joint lesions, you will consider—(1.) Chronic synovitis, and this term we use in the sense of chronic fungoid synovitis unless otherwise specified; (2.) Chronic osteitis, and under this term we will include to-day the various forms of osseous inflammation of the regressive type, whether dry or humid; (3.) Extra capsular, or peri-articular lesions which simulate real joint disease. This classification will be found to answer all practical and clinical purposes. On some subsequent occasion I shall enter more into the detail of the pathology of joint lesions. I wish to-day to impress upon your minds the important clinical aspects of the two great classes, chronic synovitis and chronic osteitis.

Chronic synovial inflammation gives very few symptoms, oftentimes none at all in the early stage. Its onset is very insidious, and it progresses very slowly; months being necessary, in many instances, to enable the parent of the child to determine whether or not there is any trouble; and the fact that the child does not complain of pain insures a procrastination in the greater number of instances. But when the disease has sufficiently advanced to produce subjective symptoms, when the swelling is very perceptible, when the patient commences to limp after a long walk, and there can be no error in the conclusion that there is something serious, the surgeon is consulted. It not unfrequently happens that it is then too late to secure the best result.

I have seen many cases of what I have called uncomplicated chronic synovial inflammation, of the variety described under remarks on pathology—viz., the fungous, proliferating degeneration, which may consume much synovial tissue without producing any pain whatever. In these cases there is no pain, but the bulging and thickened synovial sac contains either an altered secretion or a mass of fungous material. I know this, because I have frequently seen it, and the microscope proves it. But there is little or no true pus. And this emphasizes the conclusion that the morbid changes which take place in chronic joint disease are not inflammatory changes as usually understood. To return to the symptoms. There is little if any limitation of joint movement. Flexion and extension are normal, or so nearly so that careful tests alone can demonstrate any modification of normal movement. The patient bears quite rough handling of the articulation without complaint. Concussion does not produce pain or flinching; extra movement gives little or no pain. There is usually no cartilaginous crepitation, no involuntary muscular resistance, and no muscular wasting except that due to disuse. The gastrocnemius, the lateral and the anterior muscles, show no material reduction to the faradic current. It is a chronic degenerative lesion of a simple serous membrane, uncomplicated by any extensive change in the cartilage, and unaccompanied by any osseous inflammation. Such cases as these fall to the notice of every hospital surgeon, and in some instances their true nature is not recognized until a considerable deposit of fungoid or granular matter has occurred. But some of these cases have a subsequent history. They may progress in spite of any treatment which is adopted. These fungous, proliferating masses, in certain instances, go on in their work of destruction: they invade the cartilage. It succumbs to their progressive movement, especially if the traumatism of locomotion is not prevented; but still there is no pain, so long as the lesion is confined to the superficial or articular surface, although the debility of the limb is increased. But finally the work of disintegration becomes almost complete.

The surface of bone lying under the cartilage becomes affected, and these granular, fungoid masses find new fields for labor. With an energy which is unmistakable they attack the cancellous structure of the bone, and the minute nerve filaments which are so abundant in all epiphyses begin to show the effect of exposure to this peculiar morbid process. It is now that the limping amounts to a real debility, and that pain, muscular spasm, and muscular atrophy appear. The muscles do not so readily respond to the faradic current. The patient becomes more or less disabled, and crutches or some artificial aid to locomotion is introduced. If not treated at all, they finally get well with deformed and stiff joints, for it is very unusual for children with ankle-joint diseases to die from the disease under consideration. We have no record of any such result. Here, then, you have a brief clinical description of chronic synovitis, which finally also becomes a chronic osteitis of the ankle-joint. The symptoms are objective in the first part of the history, both objective and subjective in the second part. There is a peculiar lesion of an almost nerveless tissue at first, followed by a progressive and destructive extension of this lesion through the cartilage to the sensitive and vascular epiphysis. There should be no question about your diagnosis in these cases. Chronic synovitis and chronic osteitis of the ankle-joint should never be confounded—though, of course, they frequently co-exist—when, also as a matter of course, the osseous symptoms are those which are important and urgent.

The progress of this disease may be the reverse—that is, you may find symptoms of bone disease with no effusion or deposit in the synovial membrane. I have seen many cases where there was no evidence whatever of synovial disease. The initial lesion commenced in the bone, and did not involve the surrounding structures, for the fungous caries, the granular caries, the dry caries, or the silent caries (whichever you may see fit to call it), frequently exists for years uncomplicated by synovial disease; or if this membrane does become involved, it is late in the history of the lesion and after the cartilage has been destroyed. Under these circumstances we find the pronounced limp first, then the spasm and atrophy, without any evidence whatever of synovial disease or synovial degeneration.

The symptoms then to be noted are: In synovial disease, (1) change in the outline of the joint, and (2) a sense of fluctuation, or one which resembles it; a doughy, elastic feeling. Accompanying this state there is an almost normal use of the joint without any pain or marked limping, the latter occurring after long or fatiguing walks. In chronic disease of the bone we find—(1) an involuntary reflex muscular spasm which may render the joint so stiff as to suggest anchylosis; (2) pain, either orally expressed or manifested by an involuntary and very suggestive shrinking and facial expressions; (3) an absolute inability to use the joint in walking in many instances; (4) muscular wasting not accounted for by simple disuse; (5) reduction of the faradic contractility of the muscles affected by the reflex muscular spasm. In ankle-joint disease the nocturnal osteitic cry, which is very often noted in disease of the hip, knee, and spine, is not frequently present. It does occur sometimes, however, and should always be sought for. In uncomplicated synovial disease these purely involuntary and reflex symptoms do not appear. The clinical difference between these two conditions is plain and unmistakable, as I shall hope to show you.

Chronic bursitis may be mistaken for chronic synovitis. But the careful observer will not mistake it for chronic osteitis, for reasons which you can now appreciate. Bursitis may deform the region in which you would expect to find synovial effusion, and objectively give all the signs of synovial disease or distension. But if you are in doubt, use your hypodermic syringe and draw a quantity of fluid from the sac. The effusion of chronic bursitis is, practically speaking, an increased or slightly modified normal secretion; the contents of the synovial sac in chronic degenerative synovitis are far different, and in some instances you will not be able to obtain any fluid whatever.

Tarsal disease may arise and closely simulate ankle-joint disease, or by involving those articulations to which the synovial membrane of the ankle joint sends reflections, may lead to secondary and true inflammation of the ankle-joint itself. But also bear in mind that we draw a distinct line between chronic synovitis and hydrarthrus. The former, we hold, means a regressive metamorphosis of joint tissue; the latter signifies an increased natural or nearly natural secretion. In considering tarsal disease, therefore, bear in mind this distinction, as well as in other conditions. Note also that in tarsal disease you find almost always *bone* disease, not an inflammation of the inter-tarsal synovial membranes, which undoubtedly occurs; but as at the hip-joint synovial disease is not easily recognized. And the important element of reflex muscular spasm helps us greatly. It is a rule to which there are few, if any exceptions, that *true* reflex muscular spasm is found only at the diseased articulation: for example, in hip disease we have reflex spasm, limiting motion at the hip, but *not* at the knee, though we have muscles which act on both articulations. So in tarsal disease: for example, again; medio-tarsal disease, *per se*, does not produce true reflex spasm *at the ankle*. I have seen extensive tarsal disease without any interference with ankle-joint motion. And you may know that you have no extensive *bone* lesion at the ankle-joint if you find the movements normal or nearly so; and reflex muscular spasm does not enter into a consideration of tarsal disease any more than it would into a consideration of sacro-iliac disease, for instance. If there should exist astragulo-scaphoid, or calcaneo-astragular disease, remember what I have said already—viz., that so long as the true articular surfaces are free you will not find the symptoms which characterize ankle-joint osteitis.

You may find neuromemisis (a term introduced by Paget to indicate hysterical affections) of the ankle-joint. Even in children you may find this condition. Neuromemisis of the ankle-joint may simulate either chronic synovitis or chronic osteitis. The joint may be swelled, hot, painful, and very stiff. You may have apparently all the important signs of chronic or acute joint inflammation, but if you have once mastered the clinical aspects of reflex muscular spasm you will not be deceived by these cases, and the differential diagnosis between the hysterical ankle and chronic synovitis cannot be difficult if you are acquainted with the natural history and course of the true disease. A close study will develop some important variation not consistent with the true disease. But I will mention one or two points that may aid you. The conditions in true disease do not vary. Though subject to periods of remission in its first stage, the tendency of ankle-joint disease, whether synovial or osseous, is to slowly and surely progress. The neuromemitic varies greatly and without regard to any recognized law. On the other hand this granular caries, this fungoid caries, this silent caries, is very suggestive of simple functional disturbance. Esmarch was in doubt regarding such a case as this, and the foot was finally amputated for extensive disease. I have seen many cases of real joint and spinal disease going slowly but surely to destruction with a diagnosis of hysteria, malaria, or neurasthenia, when this silent fungoid disintegration was going on. Don't fall into the error of calling real disease *hysterical*. If you err at all, give your patient the benefit of the doubt. You had much better unnecessarily treat a hysterical joint, than to aggravate the morbid state, by adding the element of traumatism, which is destruction itself.

The position assumed by the foot in chronic osteitis of the ankle-joint is due not to any intra-articular effusion, nor, ordinarily, to any loss of substance in the joint ends, but to muscular spasm. The fact that the inter-articular effusion has nothing to do with this deformity is proved by the fact that the synovial membrane may be distended very greatly, as in hydrarthrus, and yet no malposition occurs, while in that form of disease which is characteristic of osteitis, and where there is no effusion at all, the malposition is the most exaggerated and the most difficult to overcome. This muscular spasm exists in chronic osteitis always, especially when the articular lamella and cartilage are involved; it is never present in uncomplicated chronic synovitis, and its presence is, while a conservative effort on the part of nature, a constant source of irritation and danger to the joint. It is always present when the stimulus of over movement is applied, and no effort of the patient's will-power can successfully combat it. Sleep does not modify it; opium or chloral cannot, in ordinary doses, annul it. But one thing within the range of known therapeutical agents that I have tried can overcome it, and that is the profound anæsthesia of ether or chloroform. Bear these facts in mind, they will be useful to you; for I have known eminent authorities to err in diagnosis because the suspected joint moved easily under anæsthesia.

The foot, in ankle-joint disease, may assume almost any position. It rarely presents as a varus deformity, however; nor does the joint always become extended, as you would naturally expect, for the extensors are the strong muscles at the ankle, and it is a rule at other joints that the limb takes the direction of the stronger group. You can easily imagine that the patient would present the heel to the floor and bear his weight fairly on the affected articulation, rather than to extend the foot and thus add motion to pressure in locomotion — a condition always avoided by patients with chronic articular osteitis. But the foot is, almost always, nearly straight, or there is a more or less prominent valgus, with slight flexion or slight extension. And if you remember what was stated when we spoke of the normal motion of the ankle, and that there was a movement outward of the foot when flexion occurred, you will see why the valgus occurs with flexion.

The more attention one devotes to chronic ankle and knee-joint diseases, where the morbid processes may be closely watched, from a clinical standpoint, the more he will become convinced that the ground taken by us regarding the relation of muscular atrophy and muscular spasm to chronic joint disease is correct. Their value, in a diagnostic point of view, is great. Indeed, these two, muscular atrophy, and even bone atrophy and reflex muscular spasm, form the basis upon which a correct diagnosis is to be made in certain instances—just as their absence is of value. I therefore call your especial attention to them, and shall ask you all to follow me closely in my tests, and to avail yourselves of the clinical opportunities which will be afforded you here to study them.

In order, therefore, to fully prepare you for your study I will close by speaking of the most important of these diagnostic elements, for they are as applicable to knee and hip disease, which we shall consider later, as they are to ankle disease, which we are considering to-day.

Reflex spasm, as presented in chronic joint disease, may be defined as an *involuntary* muscular protection of an inflamed articular surface. Bear in mind the qualification *involuntary.* You will soon learn, by clinical experience, the great difference between a voluntary, and hence irregular or varying muscular resistance, and the involuntary and hence, in this instance, unvarying muscular spasm. Of the cause of this involuntary spasm I shall speak later. I wish now to particularly emphasize its clinical features. The muscles which resist are not generally in a state of permanent spasm. It is only when anchylosis is simulated that the spasm is always present. If you flex and extend an inflamed ankle joint with osteitis, you find in many cases a very considerable degree of movement. But before the normal limit is reached the muscles which oppose become suddenly *tetanized.* The very instant the inflamed surface or surfaces become unduly pressed upon there is an involuntary muscular resistance, and the resistance remains until the pressure is removed. You cannot overcome this spasm except by very severe measures or the administration of an anæsthetic, and the patient shows in many ways the apprehension and suffering which a persistent force entails, and an aggravation of the symptoms always follows free motion under anæsthesia. This spasm is nature's protection, and she uses it well. You cannot fail to detect it when once you have learned its peculiar properties, and once having mastered the art of recognizing it you will regard it as *the* important diagnostic sign.

Much the same may be said of reflex muscular atrophy. As I have pointed out to you already, in chronic *synovitis, per se*, you do not find either reflex spasm or reflex atrophy. In chronic osteitis you find both these elements to a greater or less degree, and they both depend upon the same cause. When the nutrition of an epiphysis is interfered with you find bone atrophy, and synovial inflammation certainly does not interfere with epiphyseal nutrition. Not unfrequently in ankle-joint osteitis I have found the tibia from one-quarter to one-half inch shorter than in the normal, as shown by the opposite or healthy one in children of five or six years. And so regarding the muscles in chronic osteitis. There is a direct relation between the location of the inflammation and the amount and the character of the muscular spasm, the muscular atrophy and the bone atrophy. If the astragalus alone is diseased we get foot atrophy, more particularly, though also you find calf wasting, but, not likely, a shortened tibia or fibula; and in some cases of ankle-joint osteitis you find that the tibia alone is shortened. All these things should be considered as a matter not only of diagnosis, but also as a matter of treatment. Let me impress you finally with the great necessity of careful study in all your cases. The field of orthopædy is not fully explored, as yet, by any means. There are many brilliant gems awaiting the patient investigator.

There are many other matters which I would like to bring to your notice to-day. But time does not permit, and they are as applicable to knee and hip disease as to the conditions we have attempted to present this afternoon. I will, therefore, call your attention to them later in the course, and will occupy the remainder of the time at our disposal by showing you typical cases of chronic synovial and chronic osteitic disease of the ankle-joint. We shall take up the subject of prognosis and treatment at our next meeting.

REMARKS ON CHRONIC INFLAMMATION OF THE KNEE JOINT, WITH DESCRIPTION OF A NEW APPARATUS.

By SIMEON A. FOSTER, M.D.,

OF NEW YORK,

ASSISTANT SURGEON TO THE NEW YORK ORTHOPÆDIC DISPENSARY AND HOSPITAL.

IN chronic knee-joint inflammation, after the lesion has involved the osseous structure, we meet with a deformity due to the action of the contracted hamstring muscles, which, unless arrested, sooner or later terminates in subluxation of the tibia. The causes operating to produce this posterior displacement of the head of the tibia, are amply explained upon the basis of the continued reflex spasm of the flexors, which gradually draws the head of the tibia backward as in the normal act of flexion. It has been pointed out by my friend and preceptor, Dr. Newton M. Shaffer, on many occasions, and I have seen many illustrations of the fact that we do not find the peculiar reflex spasm of the muscles in chronic joint disease until an osteitis is developed; or, in other words, that chronic synovitis, *per se*, is not accompanied by reflex disturbances, and subluxation or joint-rigidity is not among its characteristics. In my practice among the patients of the Orthopædic Dispensary, I have found many patients suffering from chronic osteitis of the knee, and as the Institution encourages the assistant staff in these studies, and permits a judicious latitude in the way of experiment, I was led to think especially of these cases, and to attempt to devise an instrument which would meet the indications and which would be easily and readily adjusted. No one who has seen the admirable action of Dr. Shaffer's knee-splint[1] can doubt that it meets in every way the indications in chronic osteitis. It is, however, somewhat expensive, and some experience is needed to properly manipulate it.

The splint I have devised was suggested by this apparatus, and its essential principles are some of its features. I have often noted the great relief afforded by rest in chronic osteitis of the knee-joint. In dispensary practice I have used a simple retention splint with immediate, but as the sequel proved, temporary relief. There would occur, sooner or later, paroxysms of pain, indicating that there was some defect in the system of simple rest and immobilization. In a recent lecture upon this subject, Dr. Shaffer has distinctly pointed out that the ordinary forms of apparatus, and those making a fulcrum of the diseased articular surfaces, produce a greater or less modification of mobility; but they do not remove inter-articular pressure, nor do they antagonize the reflex muscular action. In order to successfully meet all the indications, we must apply a direct pressure to the head of the tibia, not at its lower third as is usually done, and a direct traction should be applied after the head of the tibia has been either supported or slightly moved toward extension.

Dr. Shaffer also rightly insists that in imitating the movement of the tibia, while passing from flexion to extension, we should have an independent movement of the apparatus at the knee-joint. In his apparatus he has introduced this very accurately, and it accomplishes all that is desired. In my own splint I have introduced a bar with a slat and screws, and an antero-posterior hinge, so that in applying extension we can carry the head of the tibia toward extension and then apply traction in the acquired position, as in Dr. Shaffer's splint. The advantage claimed for this splint is that it is cheaper, more easily managed, and that, in the majority of instances, it meets all the indications.

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[1] On Reflex Muscular Contraction and Atrophy in Joint Disease, with remarks on Mechanical Extension and a description of New Apparatus. By Newton M. Shaffer, M.D., *Archives of Clinical Surgery*, June, 1877.

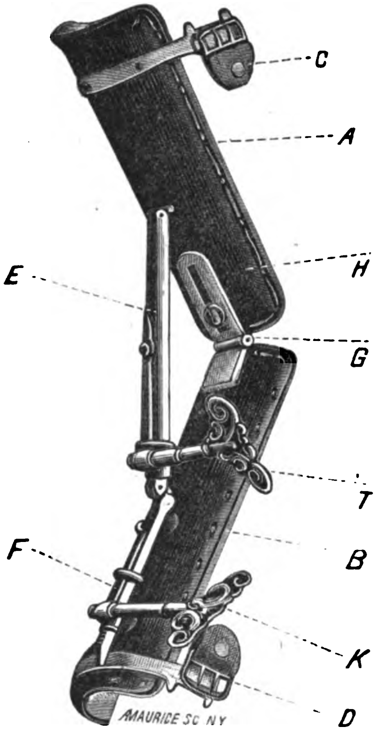

FIG. I. SPLINT FOR THE TREATMENT OF CHRONIC INFLAMMATION OF THE KNEE-JOINT.

The splint, in detail, is shown in Fig. 1. It consists of three essential parts—the thigh, the leg, and intermediate. The thigh piece A is made of sheet steel padded, and is joined to the leg piece B by the hinged slot G, and the extension rod E is made to terminate *above the center of the leg piece* B, so that as we apply an extension force—the slotted joint being free—it throws the whole leg piece forward at the expense of an independent movement at the hinged slot. The slotted joint is then fixed by turning the nut with a wrench. We therefore throw the whole tibia forward toward the position of extension, and in the acquired position we apply a direct traction by the traction rod F. All inter-articular pressure is thus removed, and we have an advantageous position without making, as do the ordinary forms of apparatus, a fulcrum of the diseased articular surfaces.

To properly adjust this instrument, we first apply adhesive plaster to the leg and thigh, after the Davis method.[1] We apply strips to either side of the leg and thigh, and attach webbing to the ends so that they may be properly secured to the buckles on the bands at either end of the splint. Over the plaster a bandage is applied. The apparatus is then fixed to the limb by the webbing straps and buckles and a few turns of bandage over the lower portion of the splint and leg; extension is then made until the head of the tibia is firmly supported, the joint is then made fast. The apparatus is now adjusted, as all apparatus should be, in the exact position of the deformity. The whole splint is now bandaged firmly to the leg, and finally true traction is exerted by the rod at F. The extension bar E can now be used gently, and the flexion reduced to a moderate degree. Never use force enough to give the patient any pain.

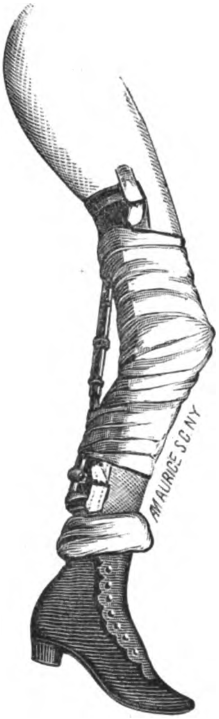

FIG. 2. SPLINT IN PLACE.

Fig. 2 shows the instrument applied. I have used this splint in five cases, and always with marked relief. Its application is simple, its cost is comparatively little, and it needs no special training to adjust it.

In taking the measurements for the instrument maker I use a piece of ordinary pasteboard cut long enough to cover two-thirds of the posterior portion of the thigh, starting from the knee. The same pattern is taken of the leg. The pieces are then cut the proper width, which should not be so wide as to enclose the thigh or leg to any extent, but only sufficient to make a shallow trough in which the limb will rest comfortably; next I take the circumference of the thigh at its upper two-thirds, taking half of this measurement as the size of the band to which the buckles are attached. The same measure is taken for the band on the leg piece. The angle of flexion is then taken. This is not absolutely necessary, as the extension bar can be made short enough to allow the splint to be flexed to a right angle without interfering with its efficiency. The instrument may be used for either the right or left limb.

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[1] Conservative Surgery. By H. G. Davis, M.D., page 233.

This instrument may be ordered from Mr. A. Müller, No. 106 West Thirty-seventh street, New York, who has made several for me.

THE EFFECT OF GENITAL IRRITATION IN THE PRODUCTION OF NERVOUS DISORDERS.[1]

BY LANDON CARTER GRAY, M.D.,
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LECTURER ON DISEASES OF THE NERVOUS SYSTEM IN THE LONG ISLAND COLLEGE HOSPITAL.

WE are apt to forget how easy it is to start a fashion in medicine. Let any one—if he be of eminence, so much the better—advance a new opinion, in support of which he shall cite cases that contain sufficient truth to give them an air of value at first sight, then let him make some earnest and confident assertions of opinion, he who deludes himself carrying, of course, infinitely more conviction than he who merely deludes others—and the thing is done. The journals, hungering for novelties, circulate the news. The profession itself, I am tempted to say almost in proportion as it is intelligent and studious, has a strong tendency to mistake novelty for progress. From hospitals and clinics come manifold seeming confirmations. It may even happen that the original writer is outdone, and lengths are easily reached that were far beyond his vision. A warning voice may here and there be raised, but it must be of authority to create more than an echo, and even then it may fail to effect its purpose. So the discovery advances on a royal road, swelling with the bulk of success at every step. It is difficult to stay it. It is always difficult to dislodge an idea from the aggregate mind of a mass of men, especially of professional men; but when it has stolen in under the guise of science or art it is likely to be guarded with a particularly jealous care. Being in possession, it holds on with the tentacles of mental habit; many observations have been adduced in proof of it; the refutations come late and are few in number as compared with the confirmations; the confirmations have perhaps taken possession of a thousand minds, whilst the refutations may make an uncertain impression upon a hundred; many who have publicly announced their belief keep secret the lack of faith that may come to them; there are few who possess the habit of mind that would lead them to critically weigh the evidence, and fewer still who will trouble themselves to do this weighing. So Error, fleet-footed, speeds its way, while Truth comes tardily after, if it comes at all.

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[1] Read before the New York Neurological Society November 1, 1881.

The history of the question of reflex paralysis is an illustration of this course of events. And here let it be premised, before we plunge into the thick of our subject, that by reflex paralysis is meant one dependent upon irritation of some peripheral nerve, either of the internal or external tissues, which is attended by no structural alterations of the nervous centres visible to the microscope, and which is relieved by the removal of the irritation. This is, of course, a somewhat arbitrary limitation of the term, although it is sanctioned, I believe, by the tacit unanimity of all the authors.

Some of the older writers, whose works are curiosities to-day, have written passingly of cases of this kind, which they attributed to lesions of the sympathetic.[1] But the really initial paper upon this subject was the celebrated one published by Mr. Stanley in 1833.[2] He had collected a number of instances in which disease of the kidneys or urethra had been accompanied or followed by paralysis and other grave nervous disorders, in some leading to a fatal issue. Marked lesions being found in the genito-urinary apparatus, and none being apparent to the naked eye in the spinal cord, he concluded that the nervous symptoms were of a reflex nature. His theory was probably based upon the writings of Marshall Hall, which had just been published with illustrative cases, upon the excito-motor or reflex functions of the cord. Mr. Stanley did not wait long for followers of distinction. Rayer, in France; Henoch and Romberg in Germany; Holland and Graves in Great Britain; then Notta, Leroy d'Etiolles, Esnault, Landry, Macario; from these authors came a number of instances of paralysis seemingly caused by genito-urinary disease, intestinal troubles, worms, even pleuritic and pulmonary affections.[1] Comhaire brought physiological aid to the cause by his assertion that removal of a kidney from a dog caused paralysis on the same side.[2] It was not until 1856, twenty-three years after the publication of Stanley's paper, and after it had met with general professional acceptation in the three most civilized countries of the world, that a capable, virile critic arose in the person of W. Gull, now Sir W. Gull, to call attention to the fact that Stanley's cases were utterly worthless as proof of reflex paralysis. Mr. Gull wrote still more forcibly upon the subject again in 1861, in a paper which Dr. Weir Mitchell very properly designates as brilliant.[1] In both these communications he pointed out, what it should seem might have been at least suspected half a century ago, that marked lesions of the cord might exist without being apparent to an eye unarmed with a microscope; moreover, that, even according to Mr. Stanley's own statements, several of the cases reported did present some evidence of gross disease of the cord or its membranes; and, finally, an instance is related in which gonorrhœa and syphilis were followed by paraplegia, terminating fatally, when the cord, macroscopically sound, was found to have undergone "a fatty degeneration" below the sixth dorsal vertebra. The tide of opinion now turned in the opposite direction—whether from the example set, or from the more extended study of nervous disease with the microscope, or from both causes combined, it would be difficult to say after this lapse of time. Jaccoud followed in the same sceptical vein in France.[2] Hasse and Valentiner raised their voices in protest in Germany,[3] and Romberg formally abandoned the theory of reflex paralysis in the third edition of his work. Leroy d'Etiolles[4] extirpated the kidneys of dogs without the supervention of paralysis, thus flatly contradicting Comhaire. Kussmaul[5] had the good fortune to make a post-mortem examination of a man who became paraplegic during chronic cystitis, and in whom he found atheromatous degeneration of the hypogastric arteries and fatty transformation of most of the nerve tubules of both sciatics. Leyden reported two interesting cases of paralysis, seemingly caused by vesical disease, in one also accompanied by long-standing urethral strictures, and in whom the cord was intensely and extensively softened, there being also cerebral foci of disease; the myelitis, too, had begun at the points of exit and entrance of the vesical nerves. Weir Mitchell, in our own country, made clear, by a searching analysis of the various cases, that there was grave doubt as to whether the genito-urinary lesions in many of them were not the *results* or *accompaniments* of spinal disease, instead of being the *causes*.[1] Notwithstanding this long array of proof in contravention of Mr. Stanley's conclusions as to reflex paralysis from genito-urinary disease, M. Brown-Séquard steps forth, as late as 1873,[2] as a champion of the old doctrine, cites all the old histories, and gives minute directions for the recognition of this particular form of palsy. But this has been a mere episode in the march of science. Tiesler,[3] Feinberg,[4] and Klemmu[5] have demonstrated, by experiments on dogs and rabbits, that neuritis of the sciatic nerve, induced artificially by caustics and irritants, can set up myelitis, and peri-pachymeningitis, which is often extensive, in one instance reaching to the cerebrum; and at the present day all the leading writers on nervous diseases have almost entirely discarded the older views, some of them admitting rare exceptions, it is true, but exceptions which constitute an exceedingly

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[1] Thus Joseph Franck, Helmstedt, 1750, quotes Conrad Fabricius; Whytt (observations on the Nature, Causes, and Cure of the Disorders which were commonly called Nervous, Hypochondriac, Hysteric, etc. Edinb., 1767) has some remarks; also, Prochaska: Institution physiologiæ humanæ, vols. i. and ii. Vienna, 1806.

[2] Urinary Paraplegia. *Medico. Chir. Transact.*, vol. xviii., 1833, p. 260.

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[1] It is perhaps unnecessary, at the same time that it is exact, to give the precise references to these names:

Rayer. Traité des Maladies des Reins, vol. iii.
Henoch: quoted in Leyden, Klinik der Rückenmarks Krankheiten, II. Bd. 1ste Abth. S., 215.
Romberg. Lehrbuch der Nervenkr. 1846.
Dr. Calvert Holland. Edin. Med. and Surg. Journ. 1845. Vol. lxiii., p. 325.
Graves: Clin. Lectures on Pract. Med.
Leroy d'Etiolles: Des Paralysies des Membres inférieurs. Paris. 1856.
Esnault. Des Paraplégies Symptomatiques de la métrite et du phlegmon uterin. Paris. 1857.
I have not been able to obtain these two latter monographs.
Macario: *Union Méd.* 1859, p. 276.
Notta: *Archives de Méd.*. Nov., 1854, p. 556.

[2] Sur l'exstirpation des reins. Paris. 1840. (I know of this work only by quotation.)

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[1] W. Gull. *Medico. Chir. Transac.* 1856. Vol. xxxix., p. 195. *Guy's Hosp. Rep.* 1861.

[2] Jaccoud. Les Paraplégies et l'ataxie des mouvements. Paris. 1864. P. 353.

[3] The writings of these two gentlemen seem to be rather mythical, for, although they are alluded to by many, no one gives a reference, and I have been unable to lay hand upon their articles.

[4] Op. cit.

[5] Würz *med. Zeitschrift.* iv., p. 56, 63. (I know this only from the quotations in Leyden and Jaccoud.)

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[1] *N. Y. Med. Journal.* 1866. Part second.

[2] Lectures on Diag. and Treatment of Principal Forms of Paralysis of the Lower Extremities. Phila. Lippincott & Co. 1873.

[3] Ueber Neuritis. Königsberg. 1869.

[4] Ueber Reflexlähmungen. *Berlin: Klin. Wochenschr.* 1871, No. 41, and 1874, No. 44–46.

[5] Ueber Neuritis Migrans. Strasburg. 1874.

meagre outcome of the claims that have been made in the past.

In this country the question has assumed a different phase during the last decade, owing to the energy and widespread reputation of a New York physician. In the cases of which we have been speaking the alleged cause of the paralysis was in the kidneys, bladder, prostate, urethra, uterus, or intestines. Dr. Lewis A. Sayre, in two articles, one published in 1870, the other in 1875,[1] has claimed that phymosis, adherent prepuce, and irritable clitoris, are frequent causes of paralysis in children, of retention of urine, and of many slighter nervous disorders. Dr. I. Baker Brown, of London, had before this set the medical world of England by the ears concerning the value of clitoridectomy for the relief of epilepsy, hysteria, catalepsy, etc., and had provoked a furious discussion, partly medical, partly ethical, that culminated in his trial before the Obstetrical Society of London, his expulsion therefrom, and his resignation from the London Medical Society—harsh measures, doubtless, which could only have been taken in consequence of grave indiscretion on the part of the accused, or because of great intolerance on the part of his accusers.[2] Mr. Thomas Bryant, in 1868, had narrated the histories of eight cases of urinary difficulties in childhood from elongated and adherent prepuce.[3] In 1872 Barwell followed with the narrative of two cases of paralysis in children claimed to have been relieved by circumcision.[4] Dr. Otis, of New York, has supplemented Dr. Sayre's second paper with several interesting histories of nervous irritations thought to have been caused by this genital lesion.[1] The matter has attracted widespread attention, so much so that one would be thought to be lacking in precision did he not examine the genitals in all cases of slight nervous disturbance. Some enthusiasts have carried the matter so far as almost to look upon circumcision as a panacea, and one well-meaning gentleman of my acquaintance, who had charge of a general clinic several years ago, made such slaughter among the innocents that the mothers of his section of the city ceased bringing their male children to him. Another gentleman even, as we shall learn later, believes that he has relieved cerebral softening by circumcision, as he was courageous enough to say, ten years before, that he had cured a general paralysis with insanity in the same manner. A matter that, to use Bacon's familiar phrase, thus "comes home to our businesses and bosoms," merits critical examination.

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[1] *Transact. Amer. Med. Assoc.* vol. xxi., 1870, p. 205; and vol. xxvi., 1875, p. 255.

[2] Vide his work: On the Curability of Certain Forms of Insanity, Epilepsy, Catalepsy, and Hysteria in Females. London: Hartwicke. 1866. Also discussion on clitoridectomy through 1866 and 1867, in *Lancet*, as well as an account of his trial.

[3] Congenital Phymosis, *Med. Times and Gazette*, May 10th, 1868.

[4] *Lancet*, 1872, p. 551.

In the first place, then, what evidence is there that genital irritation causes paralysis? For proof of this we must seek Sayre's [2] and Barwell's [3] cases.

In Dr. Sayre's first paper six cases are given:

CASE I. Boy, very white and delicate, aged 5 years, unable to walk without assistance, or to stand erect. Knees flexed at about angle of 45°. When child's attention was turned to something else, very little force could extend the legs normally, but they returned to the flexed condition as soon as the hold was released. No irritation of the quadriceps could extend them except slightly. Elongated, very tight and firmly adherent prepuce, meatus as inflamed as in a severe granular urethritis, and upon touching the urethral mouth an orgasm and slight convulsion were produced. Child frequently awoke in the night complaining of the pain in the penis, which was also evoked by the friction of his clothing in riding. Circumcision and adhesions loosened. In less than two weeks the wound had healed. Improvement in the general health from the day of operation, and at the end of two weeks could extend his limbs perfectly straight while lying on his back, and in five weeks could walk with limbs quite straight, being discharged as cured about a week after.

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[1] These can be found at the end of Dr. Sayre's last article, cited above.

[2] Op. Cit.

[3] Op. Cit.

The history is incomplete, as nothing is stated about the duration of the trouble, its onset, whether there was a return of the symptoms after discharge, and there is nothing to indicate that the patient was examined for organic nervous disease; but so far as the history goes, it would certainly seem to be that of a delicate child whose penis was in an unusually and painfully inflamed condition, who instinctively flexed his legs to relax the strain of the abdominal muscles and keep away the clothing from the inflamed part, and who would not walk because of the suffering this entailed. Considering his youth and the agony he must have endured, it is by no means remarkable that a week passed after the healing before he would venture to stretch his legs, and three before he would walk alone.

CASE 2. Boy, æt 14, paralysis of lower extremities for about four months. Phymosis. Circumcision done. Symptoms entirely relieved.

Nothing is said about the degree of the paralysis, or as to whether it might not have been due to organic changes or other causes that could have passed away in four months.

CASE 3. Boy, aged 15. Said to have had "nervousness and fainting fits," as well as "weakness and neuralgia of the legs, which caused him to trip easily and fall." Fits once or twice daily, slightest irritation of the penis produced painful erections. Phymosis. Up to six weeks after circumcision he had no return of the fits, but nothing is said as to the effect of the operation on the legs.

History very incomplete; no proof that paralysis was due to genital irritation; and if the "fits," which are not described, were epileptic in their nature, it would be quite probable that circumcision in the case would cause them to cease temporarily.

The histories of three other children are given in a general way in this first article of Dr. Sayre's. Three little boys, aged respectively 7, 9, and 13 years (cases 4, 5, and 6), were brought to him in the second stage of hip-joint disease. They were said to have been clumsy boys, and to have been "tumbling down all the time." Phymosis was found in all three cases, and irritable penes. Circumcision, to use Dr. Sayre's own words, "at once quieted their nervous irritability." This is absolutely all the history given. We are not informed whether they were suffering from spastic-spinal paralysis, such as has been described by Erb[1] and Seguin,[2] whether it is meant that their irritable penes were relieved or their habit of stumbling, or whether the improvement was permanent.

Dr. Sayre gives the following cases in his second article:

CASE 7. Boy, 3⅓ years old. "Has frequently through the day what the mother terms 'spasms of ecstacy,' in which he laughs immoderately, and his eyes are bright and glistening, but yet he apparently sees no object, and the penis is in a state of extreme erection." Cannot see, although eyes have been examined and found sound. "Unable to stand; incapable of voluntarily contracting any of his muscles when standing, or rather when being held in the upright posture, as it was impossible for him to stand, but when lying on his back for some time can move his hands and can turn over; but when held upright his legs always spasmodically cross each other, hands close, wrists flex, elbows the same; in fact, all the adductor and flexor muscles act and produce a strange distortion: the mouth opens, and there is a vacant stare of idiocy with a curious laugh of half intelligence. The penis is in a state of almost constant erection, and greatly excited at the least irritation. The meatus is red and tender. Teeth nearly all destroyed by medicine, and is now nourished on a bottle." Phymosis, firmly adherent prepuce. Dr. Sayre circumcised him on the spot; and at the next visit the child shook hands with him, which he had never done before in his life. Considerable improvement is said to have followed, but not a cure, as about eight months afterward "it could not hold its head up with the strength of the normal child, although it could sit down and get up and stand balancing itself without assistance; could speak several words, and had acquired the power of eating."

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[1] Ueber das Vorkommen der "Spastischen Spinallähmung" bei kleinen Kindern. Memorabilien, 1877. 12 Heft.

[2] *Arch. of Med.*, February, 1878, p. 80.

This was very evidently a well-marked case of spastic disease, from what cause cannot be determined from the meagre history; but there is no proof that it arose from the genital irritation, and it is undecided as to how much of the improvement was due to the circumcision, how much to the cessation of the vigorous dosing that had destroyed the teeth, and how much to the inherent tendency of the disease itself.

Case 8. Boy, æt. 2. Eight months before had slight fever for a few days, then paralysis of lower extremities, most marked in left leg. Both lower limbs weak, left the most so. Half an inch atrophy of left leg. Muscles respond to electricity. Congenital phymosis. Improvement at once, and about three weeks after is said to have gained perfect use of limbs. Electricity was used daily soon after operation.

This was probably a case of myelitis of one anterior cornu, which was probably in a convalescent stage, at which such cases can be improved by circumcision, as I shall endeavor to show in due time, and which was probably greatly aided by the electricity.

Case 9. Female, æt. 3¾. Delivered by forceps. Unable to keep the body erect; could not roll over. Cannot stand; adduction of both lower limbs, which cross one another. Adductors and tendones Achillis tense. Clitoris is red; touching it excites spasm of thighs. Clitoris removed. Some slight improvement two days after, but it could not have caused much elation, because the tendones Achillis were cut on the third day and the child placed in a wire cuirass; next—how long after the history does not state—the adductors on either side were divided, and the legs kept abducted by two iron rods; finally, electricity and a wheel-crutch are brought into play, although we are assured that "the girl moves her limbs more readily, has more power over her body, and contraction at the knee daily lessening."

This was probably a case of meningeal hæmorrhage, such as not infrequently occurs from forceps delivery, with secondary degeneration of the lateral columns of the cord. We can hardly be expected to regard the red clitoris as the cause.

CASE 10. Retention of urine from paralysis of bladder, in man of 54 years. Phymosis. Catheterized on first day, again on second, and then circumcised. On third day passed his water voluntarily, and is said to have done so ever since, although there is nothing to show that Dr. S. ever saw him again, as he was a hotel patient.

This case requires no comment.

CASE 11. Male, æt. 3½. Some lameness of right leg; trips and falls. *Very slight pain on complete abduction and eversion oj the right thigh.* Extension, adduction and flexion perfect; penis large, extremely erected; "prepuce firmly adherent to the glans around urethral orifice, drawing it open when organ was erected." Circumcision, and alleged cure in short time.

The history is too incomplete to enable us to decide whether this lameness, which was apparently but slight, was due to pain in penis caused by certain muscular movements, as of abduction and outward rotation of the thigh, or whether the case was one of previous myelitis of the anterior horns, which had left this residue of paresis to be relieved by the circumcision, or whether the paresis was really caused by the genital irritation.

CASE 12. Case of asserted paralytic club-foot, about which Dr. Sayre was written. Phymosis, with adhesions. Circumcision is said to have effected distinct improvement.

Not enough of the case is told us to warrant any conclusions.

CASE 13. Idiocy, spastic contraction of lower limbs. Clitoris very red and irritable, touch upon it causing spasm. No age given, or any other details whatsoever. Clitoris clipped and cauterized, and wire cuirass applied. Nutritious diet and tonics ordered.

This history is certainly not precise enough to establish a new or decide a contraverted point.

CASE 14. Double varo-equinus, congenital, in child of 3 years. Mechanical treatment applied since child four months old. "Feet were readily replaced in normal position by the hand, but immediately returned to their deformed posture when the support was removed. Phymosis. Circumcision. Two weeks after child could stand flat upon his feet, with some inverson of left great toe.

Although this does seem at first sight to have been a paralysis due to the phymosis, the removal of which seems to have cured it, yet in strict justice it must be borne in mind that it is not proven that it was not originally of organic or other origin, nor that it was not due to the enforced rest of the prolonged mechanical treatment, and, moreover, no mention is made of the subsequent progress.

In the appendix to his second article, Dr. Sayre adds these cases:

CASE 15. Male, 3⅔ years. Increasing feebleness of lower limbs for a year. "Could not stand without support, and even when supported his legs would bend in different directions." Phymosis, firm adhesions, which needed to be cut. Entirely well at the end of twelve days.

This does certainly look like a paralysis from adherent prepuce, and I should believe it to be so if a full history did not contradict this scanty one.

CASE 16. Male, 3½ years. Became lame in left leg when one year old. Atrophy of left leg at time of examination. Child falls continually. Foot everted. Iron brace is worn on outside of leg. Phymosis. Circumcision. Five days after walks without a brace, does not fall down, and ran round the room for first time in two years.

How long had the limb been confined in the brace? And how can we determine how much relief came from the circumcision and how much from removing the brace?

CASE 17. Reported to Dr. Sayre by letter from Dr. J. H. Adams, of Texas. It is simply the case of a gentleman of 27 who had had a large portion of the cutaneous surface of his penis behind the corona removed by some enterprising surgeon as a substitute for circumcision, in whom a dense cicatricial band formed at the site of the operation, who suffered great pain from it, and "whose locomotion," very probably for this latter reason, "became impaired." Incision of the band relieved him.

CASE 18. Reported by letter from Dr. T. F. Leech, of Indiana. "Paralysis of lower half of body; also spinal irritation" (?). Of this patient the doctor writes: "Mr. John McGuire and wife, of our town, have but one child, a boy of fourteen months, who has been the terror of all this part of the town for six months, as he cries continually, except when asleep or nursed by his mother. He would lay perfectly quiet and squall!" This unpopular infant had phymosis and an adherent prepuce, as might have been expected; and was circumcised, as was proper. Three days later he was said to have "made marked improvement, and bids fair to make a rapid and complete recovery."

We are not told whether he made that recovery, and the history is too indefinite to permit of any deductions.

CASE 19. This seems to be rather a case of choreiform or chronic movements, said to have been relieved by circumcision, and is not germane to this part of my paper.

Dr. Barwell reports two cases:[1]

CASE 1. Boy, æt. 4. He had seemed ailing and fretful for a week before his mother noticed some impairment in his gait. At times becomes lost in thought, as it were, and has then a vacant stare. Phymosis, adherent prepuce. Circumcision. In a few days child is said to have walked as well as ever.

There is nothing to indicate that the possibility of organic disease was considered.

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[1] Op. cit.

CASE 2. Girl, æt. 5. Paresis of one leg of few months' duration. Sometimes worse, sometimes better. Ascarides removed, and a vaginitis treated, and the child improved, but the leg was still atrophied three months after.

Manifest to all men must be the objections to this history.

To sum up, there have been twenty cases in all reported of alleged paralysis from genital irritation. In not one is the proof conclusive of this relation between cause and effect. In two cases there is some proof, but it is not sufficient (cases 14, 15). In two cases there was probably impaired locomotion from the pain of the irritated genitals (cases 1, 17). One patient had probably had meningeal hæmorrhage during fœtal life, and secondary degeneration of the lateral columns of the cord (case 9). Another was probably epileptic (case 3); another suffering from some spastic disease (case 7); still another from myelitis of one anterior cornu (case 8), and in twelve the histories were too indefinite to render any opinion justifiable (cases 2, 4, 5, 6, 10, 11, 12, 13, 18, and Barwell's two cases).

I have taken the trouble to address letters to Drs. S. Weir Mitchell, J. M. Da Costa, A. Jacobi, J. S. Jewell, Robert T. Edes, F. T. Miles, S. G. Webber, E. C. Spitzka, E. C. Seguin, F. P. Kinnicutt, T. A. McBride, asking them if they had ever seen a case of paralysis from genital irritation, in which the proof of the facts was conclusive. They have all courteously answered me, and positively in the negative. Dr. Newton M. Shaffer has expressed the same opinion in a late article; and Dr. William A. Hammond has never seen a case resulting from preputial irritation.

In view of the foregoing data and the acknowledged standing of these gentlemen as neurologists, the conviction is irresistible that genital irritation cannot cause paralysis, or does it very seldom. My personal experience, I may perhaps be permitted to say, is in accordance with that of my correspondents.

Yet there is good reason to believe that the operative procedures necessary to the relief of phymosis and adherent prepuce often cause considerable temporary improvement in cases of organic nervous disease, especially in the later periods. This is exemplified in cases 7, 8, 9, of Dr. Sayre's papers, and in Barwell's first case. Dr. C. Fayette Taylor tells of a boy about 2 years old, evidently a post-diphtheritic paretic, who was circumcised by Dr. Fruitnight because of phymosis and adherent prepuce, and who derived great benefit from the operation.[1] I have had four curious cases of this kind in my own practice.

CASE 1. Boy, about 3 years old, in whom a diagnosis of tubercular meningitis was made. His prepuce was long, tight and firmly adherent. I was curious to learn what effect circumcision would have upon him, and accordingly performed the operation. He at once began to sleep so much better, his irritable temper decreased so much, his appetite was so greatly improved, he seemed so much more intelligent, that I should have doubted the correctness of my diagnosis had not the symptoms resumed their former intensity in the course of the second month, and had not an autopsy, some seven months afterward, displayed to me a tuberculous meningitis.

CASE 2. Boy 2½ years old, who about a year previous had been confined to bed with slight fever for several days, then was paralysed in left leg, which shortly afterwards began to waste. Nocturnal incontinence. Drags left leg greatly in walking. Farado-contractility of the anterior tibial and calf muscles of this leg almost nil. The galvanic reaction was ascertained at the time, but no note was made of it, although I feel certain that it was the "reaction of degeneration" (Entartung's reaction). Diagnosis: Myelitis of one anterior cornu. Long, tight and slightly adherent prepuce. After treatment with tonics, good diet, and electricity for four months without marked effect, circumcision was done. The improvement in the general health and in the strength of the leg was marked, the dragging gait diminishing to a slight halt, and at this date, ten months after, the improvement has been maintained.

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[1] ANNALS OF ANATOMY AND SURGERY, Vol. iv., No. 1, July, 1881, pp. 4 and 48.

CASE 3. Male, 23 years old. Fine, rhythmical tremor, on excitement and voluntary movement only. Diplopia about three to four months ago. Tremor confined to upper and lower extremities, not in the head or neck. Tendon-reflex normal. Worker in a brass factory for seven years, where he is surrounded by a fine dust of brass filings. On excitement his voice fails him. Diagnosis : Tremor, of disseminated sclerosis type, from brass poisoning. Phymosis and adherent prepuce. After six weeks' treatment by the iodide of potash and the wearing of a wire respirator, the tremor greatly improved, but was still perceptible. He was then circumcised, and from that day forwards for upwards of two months, when I lost sight of him, he had no return of the tremor.

CASE 4. Male, aged 14. Is subject to attacks which commence by extension of right extremities, to which succeeds a tremor of them, and, when this has lasted for quite an interval, there ensues a tremor of the whole body. About half the time there would be a loss of consciousness, when the muscular movements would be more severe, and would be followed by deep sleep. At times, after one of the conscious spells in the night, patient would cry for a long time, although, as he says, "I knew I was crying, but I had to cry on, as I could not stop." He would frequently walk about his room after an attack in a somnambulistic state. These fits would come as often as ten to fifteen times daily. Diagnosis.—Epilepsy, of the Hughlings-Jackson type. This condition had begun in 1874. On October 9th, 1874, I circumcised him because of phymosis and adherent prepuce. At first the fits were only slightly decreased in number, though not so severe; but in about ten days they ceased, *none appearing from October 27th to December 16th, 60 days,* when they slowly reappeared, one to three coming every three or four days, until they resumed their former severity and frequency by the middle of January.

The bromides have a curious effect on this patient, which it is proper to speak of in this connection. They make him much worse, at times almost maniacal, after prostrating him physically to an alarming extent; *but after they have been stopped he is always free from any of his nervous symptoms for a period varying from one to two months and a half.*

[To be Continued.]

EDITORIAL DEPARTMENT.

WARREN ON HERNIA.[1]

If it is not entirely true, as was stated by Prof. Volkmann at the late International Medical Congress, "that the antiseptic method has elevated surgery to the rank of the least experimental of sciences," we must believe that the stimulus given thereby to its study and perfection of detail has achieved a progress which marks an era in the history of medicine. Of its many departments, the complex question of hernia and its treatment has presented no subject more difficult. Indeed, hernia has been an opprobrium of the surgical art—in large share a recognized acknowledgment of the failure of its devices to effect a cure—and to-day thousands are condemned by it to life-long inability to pursue certain occupations and professions.

The late Prof. Velpeau wrote: "The radical cure of hernia would be too important a triumph for surgery, and a resource too deeply interesting to humanity, to permit that we should not endeavor to improve it still more, and to modify its processes and to make renewed efforts for the purpose of attaining this result. For myself I cannot cease to entertain the idea that in the experimental spirit of our age we may succeed in obtaining a remedy of this description which shall be of real efficacy." More recently, Mr. Spencer Wells stated: "I believe the time is coming when most cases of reducible hernia will be readily cured by the surgeons, if not of this generation, certainly of the next."

Among those who have given hernia thoughtful and painstaking study, we are glad to give prominence to Dr. Joseph H. Warren, of Boston, who has recently furnished to the profession his elaborate treatise upon the subject under the title of "A Practical Treatise on Hernia," issued by Osgood & Co., of that city. It is a second and revised edition; the first was published about a year since. The book has over four hundred pages, upon good paper, clear type, and is finely illustrated by nearly one hundred plates, a few of which are full-page, and by the process of heliotype reproduction. It is of the superior class of work characteristic of the publishers, and in this direction is in marked contrast with the former edition.

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[1] A Practical Treatise on Hernia. By Joseph H. Warren, M.D. Second and revised edition, fully illustrated. James R. Osgood & Co., Boston. Sampson, Low, Marston, Searle & Rivington, London.

The first hundred pages of the work are devoted to the causation and different forms of hernia, with a very full chapter upon the descriptive and surgical anatomy of the disease. This part is of exceptional value, and is replete with information which can only, with difficulty, be gleaned from a study of many authors. The history of the various operations for hernia is given with great clearness, and offers in itself a marked commentary upon the progress of surgery. Nearly all the more recent operations are given with a candid and impartial discussion of their claims for consideration, which, in itself, furnishes evidence that the author is actuated only by the spirit of scientific research, and is not guided by a blind devotion to any exclusive means of treatment. Such advocacy was thought to be a serious defect in the first edition—an error in which any enthusiastic defendant of positive opinions may be pardoned, but which, in this edition, Dr. Warren has very clearly disavowed.

Chapter VI, upon the operation for the cure of hernia by injection, brings us vis-a-vis with the great object for which the book was written. It is quite generally known to all special students of surgery that Dr. George Heaton, of Boston, many years ago (from 1842 until his death, which occurred quite recently) practiced very largely the injection of an astringent fluid into the weakened tissues about the hernial opening for the purpose of producing a cure. The fruitage of his large experience was lost, in very great measure, from the fact that for reasons satisfactory to himself, based upon the belief that he had been very unkindly treated by the profession of Boston, he withheld from general knowledge this method of treatment. There is very little of his work left on record, although his cases are said to have numbered many hundreds. Shortly before his death, assisted by Dr. F. H. Davenport, of Boston, he gave to the public a small volume in which he made known his methods of treatment. A patient of Dr. Warren's, in his last illness, he fully convinced his physician of the importance of his innovations, and made of him an ardent disciple. Dr. Warren has improved the apparatus for injection as well as the fluids used. The syringe is of careful workmanship, and possesses several advantages which are claimed for it by the inventor. First, the point must be broad, and not sufficiently sharp to easily pierce a vessel. It is also flattened upon itself, and has a spiral twist which is said to facilitate very much its introduction. There are several openings upon either side for the escape of fluid, which is intended to infiltrate the tissues surrounding the puncture, and thereby produce an exudative inflammatory process.

The needle is introduced upon the finger well invaginated within the rings, care having first been taken to carry the peritoneal sac well out of the course of the needle, it being emphasized not to inject or injure the peritoneum, but to infiltrate the wall of the rings and thus produce interstitial thickening and contraction of the surrounding tissue. The fluid now recommended for injection is :

	Gm.	
℞—Fl. Ext. Querci Albæ	180	
Evaporated to	60	00
Alcohol, 90 per cent	15	00
Ether Suph		50
Morphia Sulph		25
Tr. Veratri Viridis		50

M.—Signa: Inject 15 to 20 drops in small and recent herniæ, 25 to 50 drops in large or old herniæ.

It is claimed that this is an aseptic fluid, that it may be used with safety, and very rarely produces suppuration. Suppuration is always to be deprecated, and when it occurs the result is far less satisfactory. Large or old herniæ may require several injections before cure is complete, and in such cases the injection may be repeated every six or eight months. Subsequent treatment is emphasized. An elastic bandage or truss should be appled soon after the operation and worn constantly when in the upright position, and the patient is to remain under the supervision of the surgeon for not less than one year. Many failures are attributed to the neglect of these precautions. Of one hundred and fifty cases reported and well authenticated, there were only twelve failures. It is open to criticism, however, that it is not stated if this number had been subjected to the tests prescribed as necessary—viz.: examination after one year had elapsed, or how large a proportion had been obliged to submit to subsequent operations.

Neither is it stated how large a share suffered from undue inflammatory or suppurative processes. A considerable series of cases, however, are reported in detail.

We have had the opportunity of witnessing one operation by Dr. Warren for double hernia, and the satisfaction of a careful examination one year after. In this case the hernia had not returned, and there was a marked hypertrophic thickening of the tissues about the rings; upon one side was the cicatrix of a moderate-sized abscess. The patient expressed himself as free from local discomfort.

It would be of great satisfaction if comparative histological demonstrations had been given to show the changes which ensue in the tissues subjected to the injection of such fluids; also their effect if introduced into the peritoneal cavity. The criticisms which I have felt most at liberty to make upon the method advocated is that, in the hands of many operators, if not in most, the uncertainty of the application of the fluid at the right locality would be an important factor for consideration. It must be admitted that the fluids recommended are potent for good or ill. Introduced into the cavity of the peritoneum, they cannot be without danger; and carried into the loose connective tissue outside the rings can be productive of little good, and likely to be followed by more or less extensive suppuration. This criticism of correct introduction of the fluid may be hypothetical, doubtless would be in the skillful hands of Dr. Warren; however, "blind surgery is bad surgery," and when we consider the importance of the delicate tissues involved, and the extraordinary changes to which the hernial canal is often subjected, it would seem that, if the operation by injection, as revised and improved by the author, is to win for itself an established place in surgery, it would be rather for the indirect and smaller herniæ where the pillars of the ring are not very much attenuated or the canal foreshortened by pressure. Thus would be afforded the requisite connective tissue for irritative inflammation and occlusion likely to follow. Here it may prove the most promising of all operations, for we believe our cases of hernia are not to be relegated to the instrument-maker, and condemned to a life-long, partial invalidism ever subject to possible accidental danger.

In the more serious forms of hernia, it would now seem to be demonstrated that with strict antiseptic precautions it is safe and wise to expose by section the weakened rings, exsect or occlude the peritoneal pouch, which, unchanged, must ever act as a pocket, the contents of which will serve as a wedge to distend and weaken the adjacent structures, refreshen the tendinous pillars, and unite them with animal suture.

In this way we can protect the spermatic cord from injury, intelligently restore the parts to their normal condition, and expect therefrom complete and continued cure. We first performed this operation in 1868, and our experience since has been very considerable and satisfactory. It has been repeated by many surgeons in both Europe and America. Under the enthusiastic leadership of the many special laborers in this field, if the time has not yet arrived, it is certainly not far distant, when the army of sufferers from hernia may confidently look to surgery not only for relief, but complete cure.

We commend Dr. Warren's exhaustive treatise upon a most important subject, as one of both interest and profit. The illustrations are wisely selected, many of them new, and the bibliography is extensive.

HENRY O. MARCY.

ON INJURY TO THE MUCOUS MEMBRANE OF THE TRACHEA CAUSED BY PRESENCE OF THE TRACHEOTOMY CANULA, AND ON THE CHOICE OF CANULAS.

In a series of papers in the *Hospitals Tidende*,[1] Dr. Bloch has elaborately considered injuries due to the pressure of the canulas used in tracheotomy, combining in a monographic form his own experience with what is already found in literature on the subject. He has made the autopsy of 34 patients who had died after tracheotomy. Of these he leaves out 4 who had died before or immediately after the introduction of the canula. Of the remaining 30 the trachea had suffered from pressure in 16, or 53.3 per cent.

The author, in passing, glances at the injury produced by pressure of the canula against the lips of the wound, but the real subject of his paper is the pressure caused in the lower parts of the trachea. The seat of injury is the anterior or the posterior wall, or most commonly both simultaneously. On the anterior wall it is almost always situated in the middle line and separated from the lower angle of the wound by a zone of uninjured mucous membrane. On the posterior wall it is likewise found in the middle line. It extends very rarely above the level of the lower angle of the incision, or lower down than the level of the lower border of the injury on the anterior wall. The shape of the injury on the anterior wall is circular when produced by the whole lower end of the canula, linear if only produced by its anterior circumference. On the posterior wall it is elliptical, with the long axis in the mesial line of the trachea.

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[1] Om Dekubitus af Trakea's Slimhinde, frembragte ved Trakeotomikanylen, og om Valget af Trakeotomikanyler. Dr. Oscar Bloch, of Copenhagen. *Hospitals Tidende*, 1881, viii, 61, 82, 101, 121, 141, 161.

The first degree of the injury is anæmia, the second hyperæmia, with or without hemorrhage, the third superficial erosion ; then a diptheritic process destroys the deeper parts, ending in perforation.

The whole injury is due to pressure produced by the canula. The author criticises the kind of canula used in Denmark, and as some of the faults are found in those used in this country, we also reproduce his remarks: The instrument is a double canula, forming one-fourth of a circle, the radius of which is 2.2 cm. The lower end is pushed forward with its anterior edge, which often is sharp, against the unyielding anterior wall of the trachea, the course of which lies in a *straight* line downward and backward. The convex posterior part of the canula presses against the posterior wall of the trachea, but this, being soft, is less liable to injury. The pressure is kept up on the same place by the neck-plate being immovably fastened to the tube. If the canula is too small it is pushed against the wall by every movement of the trachea; if too large it has to be inserted with some violence by which the trachea may suffer in its whole circumference.

The author gives only secondary importance to the congestion of the mucous membrane and the diphtheritic injection of abraded spots. He does not agree with Roger, that injury to the deeper parts of the trachea can be diagnosticated by a bad condition of the wound of incision. In nine of his cases the wound was clean, and nevertheless there were signs of pressure in the interior of most of them. On the other hand, he has found the wound in the neck in a very bad condition, with pronounced discoloration and fissures of the cartilages in five individuals who had no injury from pressure in the interior. In four of these the canula had been lying in the wound for 24 hours ; the fifth four days and a half.

He attributes no more value to the fetidity of the exhaled air or the expulsion of fetid mucus through the canula, because these circumstances may as well arise from other sources.

The two important symptoms are the expulsion of a little blood when the hemorrhage cannot be attributed to the operation itself, and a black color of the outer canula. It goes without saying that a severe hemorrhage is a warning of imminent danger. The black color is due to sulphuret of hydrogen, and can only be found when gangrene has set in. As the wall of the trachea has been found perforated in 36 hours, the outer canula ought to be examined already at the end of the first twenty-four hours, even if it should give some trouble to replace it before the wound has become like a tube.

Nine cases of death from hemorrhage are on record. In most cases it came from the innominate artery. The perforation of the trachea may also give rise to fistula, either on the external surface of the neck or communicating with the œsophagus.

The chief point in the preventive treatment is to use a proper canulas. After giving in detail the measurements of the trachea as found by different surgeons, and the width of different canula, the author recommends the following dimensions of the outer canulas :

Age.	Circumference.		Diameter.	
0—1 year	17	mm.	5⅜	mm.
1—2 "	21	"	7	"
2—3 "	24	"	8	"
3—5 "	27	"	9	"
5—7 "	30	"	10	"
Above 7 "	31-47	"	10⅛-15⅜	"

For general practitioners he advises especially to keep the three sizes designed for children between one and five years.

The length, as commonly used, is 4.5-5 cm., and that is satisfactory. As to shape, he gives the preference to Parker's model, with the open angle and sloping lower aperture. The canula ought to be of silver, with movable neck-plate. If the presence of an ulceration in the trachea due to pressure has been diagnosticated, a silver canula of a different length may be used, or it may be replaced by Morrant Baker's canula of red vulcanized rubber, or by a simple drainage tube of the same material retained by a large safety pin placed transversely to the direction of the wound in the neck.

If no canula be obtainable when tracheotomy has to be performed, a simple drainage tube may be used, or the lips of the wound kept apart by a couple of hairpins. By bending these and inserting the closed end into the wound, passing strings from behind the neck and tying the ends together —a modification of Monro's method indicated by Dr. Laub, of Copenhagen—the wound may be kept open in an efficient and harmless way.

As a rule, the pressure of the canula is not dangerous. In most cases it is quite superficial, and even the deeper ulcers may heal without leaving any bad sequelæ. But in exceptional cases it is a most dangerous complication.

Besides the nine cases of fatal hemorrhage mentioned above, the innominate artery was in eight others found separated from the canula by a thin, fibrous membrane which soon would have given way. HENRY J. GARRIGUES.

THE INDEX MEDICUS.[1]

The *Index Medicus* has completed the third year of its publication. For three years it has opened to every student the whole field of current medical literature. That the number of its *bona fide* subscribers has not yet become sufficient to pay its expenses, though to be regretted, is not surprising, for much of effort and of time will be needed to cause men to realize that they have a personal interest—six dollars worth annually—in anything which they do not expect to use frequently themselves. The number of busy, practical men is great; the number of studious original workers is small; yet what the latter produce, the former use. To the latter the *Index Medicus* is a necessity; without it they are crippled in their work. Indirectly, therefore, such a publication is equally of importance to the practical men, even though they never consult it themselves. Where the existence of such a publication depends on a large number of subscribers, a feeling of *esprit du corps* should prompt every member of the profession to personally subscribe for it. LEWIS S. PILCHER.

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[1] F. Leypoldt, Publisher, 13 and 15 Park Row, New York.

AN OBSERVATION ON THE MODE OF FORMATION OF THE FIBRINOUS CLOT OF AN ANEURISM OF THE FEMORAL ARTERY.

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OF NEW ORLEANS,

PATHOLOGIST OF THE CHARITY HOSPITAL OF NEW ORLEANS.

THE original or true aneurism in this case was situated about two inches below the origin of the arteria profunda, and consisted of a dilatation of the right femoral artery, about the size of a small walnut, with an orifice, slightly smaller in diameter, through which it communicated with its sac situated outside the lumen of the vessel between the neighboring muscles. The sac containing the fibrinous lamellæ, or so-called active clot of Broca, had an average diameter of about three inches, was spheroidal in shape and embedded in a considerable mass of coagulated blood, representing a so-called passive clot. The hard or active clot contained a cavity, irregular in shape, of about two inches diameter, communicating with the aneurismal dilatation of the artery through the above-mentioned orifice, and filled with a coagulum of blood. The aneurismal tumor itself consisted of fibrinous lamellæ, the arrangement and formation of which, forming the main subject of this communication, will be described and discussed hereafter.

As regards the condition of the femoral artery, its walls appeared to be diseased throughout, but particularly in the vicinity of the aneurismal dilatation, and in the latter itself. Here the internal surface of the vessel presented a very uneven appearance, marked by irregular prominences and depressions caused by the atheromatous disease of the coats of the vessel, and bearing some resemblance in form to the plicæ of the mucous membrane of the stomach. Some of these prominences were caused by the calcareous atheromatous deposit. The margin of the orifice in the artery was thickened and rounded by being everted upon itself before passing into the very thin tissue, or membrane, of the aneurismal sac, and, moreover, represented a broken ring, the ends of which passed each other for some distance, thus leaving a groove, or channel, between them through which the aneurismal current of blood had to pass before entering the cavity of the sac. The internal surface of the whole femoral artery, above and below the aneurismal dilatation, was marked by circular, ring-like ridges, or elevations, apparently representing muscular bundles of the middle coat, and caused by the disease of the vessel, though it was especially in or near the dilatation that the character of atheroma was the most pronounced.

The microscopical examination of thin, transparent, horizontal and longitudinal sections, taken from the dilated portion of the vessel and its vicinity, revealed the usual characteristic changes of chronic endo-arteritis. The chief seat of these pathological changes was in the muscular coat of the vessel, while the intima or inner coat had, at least, preserved its continuity, though its integrity, on the whole, was likewise affected. The pathological neo-plastic element was, as usually, represented by a so-called granulation tissue, consisting of an immense number of small spindle-shaped cells, the filamentary processes of which had, in some places, attained sufficient length to represent a cicatricial connective tissue, rendering the wall of the vessel hard and stiff. Although in the sections the continuity of the intima, highly stained with carmine, could be perfectly traced throughout the diseased part of the vessel, and even beyond the margin of the aneurismal orifice to the very edge of the broken wall, this coat nevertheless showed its diseased condition by a proliferation of its nuclei and cells, which, in many places, had increased its normal thickness. But whether the origin of the newly formed tissue, which, particularly in the dilated portion of the artery, had almost completely displaced and substituted the muscular element, was to be sought in the cells of the intima, or in those of the media, I leave undecided. In this locality, the muscular fibres of the latter were, at any rate, either degenerated, as their very feeble carmine staining would indicate, or displaced and scattered, as some few groups of separated but stained fibres found amidst or at the outer border of the granulation tissue seemed to show. The great thickness of the wall of the vessel, especially in the vicinity of the aneurismal orifice, was chiefly due to the hyperplastic connective tissue. Above the dilated portion of the artery the adventitia had remained intact, while at or near the orifice little of it could be detected, being displaced by the granulation tissue, which, in some places even, was bordered by the fibrinous lamella of the tumor. In the dilated portion of the vessel the disease had attained its highest degree, for here some small calcareous atheromatous plates with their edges sharply projecting, and giving rise to some of the prominences, were found embedded in the wall. From the presence of these plates it may be presumed that the aneurismal orifice was the result of atheromatous degeneration.

The degenerative atheromatous process in this case was, however, not confined to the femoral artery, but was met with in a still higher degree in the interior of the heart and arch of the aorta. In the former it had affected all the valves. Thus the tricuspid valve was found thickened throughout, while its processes presented a dilated, sac-like appearance; the mitral valve was likewise thickened by knotty deposits which had contracted its margins. The semi-lunar valves of the pulmonary artery and aorta had been converted into pouch-like dilatations, and been stiffened besides by the hyperplastic deposit; their corpora Arantii were enlarged to the size of a small pea. In the wall of the arch of the aorta large atheromatous calcareous plates were found extending back to the sac-like semilunar valves. The left ventricle was slightly dilated, and its walls somewhat hypertrophied.

The general course in this case of aneurism may be easily inferred from the above description of its pathological anatomy. The chronic inflammatory and degenerative process going on in the wall of the vessel, and giving rise to the dilatation, or primary aneurism in the true sense of the word, became more especially localized in that portion of the latter, where, at a later period, the orifice of the aneurismal sac was found; and, from the presence of calcareous atheromatous plates in this dilated portion of the artery, it may further be presumed that the process finally resulted in ulcerative destruction of the media and intima, inducing a secondary and sacciform dilatation of the adventitia, from which the later fibrinous aneurismal tumor was developed. Thus far, therefore, this case of aneurism of the femoral artery, resembling a large number of others, so often observed and described, presents no special points of interest, excepting those regarding the particular mode of formation of the fibrinous clot, to which I wish to direct the attention of surgeons.

The formation of the fibrinous clot found in the aneurismal sac was formerly regarded as taking place by a simple deposition of coagulated fibrin upon the inner surface of the latter, and derived from the aneurismal circulation. The coagulation of the fibrin was ascribed to the simple retardation of the current of blood entering and leaving the sac. The phenomenon of the clot, consisting of a number of concentric layers of fibrin, was explained by supposing that these layers had been formed at different periods, though, the whole process was compared to that giving rise to the formation of the buffy coat upon freshly drawn blood when coming to rest and in contact with the wall of the vessel in which the latter was contained.

This theory was universally held until it was considerably modified, about twenty-five years ago, by Broca, who had more thoroughly studied the subject than any other surgeon before him, and who, in his distinguished classical work on aneurism, established the theory concerning the formation of the clot upon a more solid and philosophical basis. Thus he first showed that the aneurismal clot was not the result of a simple coagulation of the fibrin of the blood, but a process regulated by vital influence. And, in accordance with this view, he made a distinction between the *active* or *fibrinous* clots, or such that are formed under vital influence, and the *passive* clots, formed after the blood ceases to obey vital laws. He furthermore showed that the fibrin would be deposited when coming in contact with any membrane, except the normal serous membrane of the vascular system, and even upon the latter, when in an abnormal condition.

Though volumes have been written on the physical examination, diagnosis and treatment of aneurism since the publication of Broca's work, the mode of formation of the aneurismal fibrinous clot, judging from the small number of lines devoted to it, even in recent voluminous standard works on surgery, has received but little general attention. The same phenomenon is observed in the current medical literature, dating back quite a number of years; this, however, may be explained in favor of Broca's theory, which, up to the present time, seems to have given a satisfactory explanation of the formative process of the clot—though, on the other hand, it must appear strange that in these days of extended microscopical research, the fundamental truth of this theory, also, should not have been reinvestigated; for, though, perhaps in most cases of aneurism, it may satisfactorily explain the process, there are certainly others, as the one under discussion, in which the formation of the clot cannot be made to harmonize with this theory.

Before proceeding to the description of the particular arrangement of the fibrinous lamellæ of the clot which I observed in the present case of aneurism, let us review the most prominent points of Broca's theory. In the true, or crateriform aneurism, he says the sac is very small, while its orifice is large; the stagnation of blood is, therefore, little pronounced, and the circulation is as free as in the artery. The internal surface of the sac represents the lining serous membrane of the vessel simply distended, and without any appreciable alteration. Therefore, the blood has very little tendency to coagulation, and it is thus that the majority of aneurisms present in their beginning no trace of a clot in cases where an autopsy chances to be made. In the sacciform aneurisms the conditions are entirely different, for whatsoever may be the origin of these aneurisms, the membrane by which they are lined always represents a cause of abnormal contact for the blood.

This assertion of Broca, made twenty-five years ago, has been fully confirmed by more modern theories, according to which a simple endarteritis or phlebitis even may give rise to the formation of thrombi in the interior of the vessels. Broca, therefore, regards the contact of the blood with an abnormal membrane as the first condition favoring its coagulation; or, in other words, the formation of a fibrinous clot. A second condition for this process to take place he finds in the stagnation, or in the diminished rapidity of the renovation of the blood in the aneurismal circulation, which is especially marked in the most external layers of this fluid—that is, those layers which come in immediate contact with the internal surface of the sac. If, he says, the blood were nearly at rest and not renewed, its stagnation would be complete, and the deposits would accordingly represent a passive clot. This, however, is not the case in the sacciform aneurisms, where the pulsations of the tumor keep the blood in a constant agitation, and where the mingling between the old and the new clot, always taking place to a slight degree even in the most external layers, does not fail to completely renovate at the end of a certain number of pulsations the liquid contained in the sac. Therefore, the clots formed are fibrinous or active clots deposited upon the internal surface of the sac, where they form a thin but quite regular layer.

This fibrinous layer, closely applied to the wall of the sac, becomes a part of the latter, and its internal surface goes to play toward the liquid blood, with which it is in contact—the same part which the internal surface of the sac played before; upon this layer others of the same nature are ultimately deposited, which, in their turn, are covered by others, and so forth.

The fibrinous deposit, from the time of its formation, is placed between the wall of the sac and the liquid blood of the aneurism. At each diastole of the aneurism it is forced toward the wall by the pressure of the blood within, while at each systole it is pushed back toward the centre of the sac by the elastic retraction of the latter. It is, therefore, always compressed between a solid membrane and a column of blood, the resistance of which is never overcome. In consequence of this continued pressure it becomes thinned out and condensed, and is gradually deprived of its serum. This condensation, therefore, is greatest in the older, or more external layers which have been formed before the others.

As the deposit of the active clots, as well as their condensation, takes place gradually, we might expect to find them consisting of one homogeneous mass everywhere continuous in itself. This, however, is never the case; for, whenever the fibrinous clots have attained a thickness of 2 mm., they are found composed of concentric leaves enveloped into each other like the pellicles of an onion. The most external of these are the thinnest, the most resisting, and the most discolored; they present a yellowish-white tint. The more internal are thicker, less dense, and of a darker color, as they contain a small quantity of blood, while the intermediate layers present physical characters showing the transition between the state of the older and more recent deposits.

The most external layer adheres to the wall of the sac, sometimes in an intimate manner, which has led to the idea that the adherence was due to a layer of plastic lymph secreted by the internal surface of the sac—a hypothesis the correctness of which, Broca remarks, would be difficult to establish. Notwithstanding, at least one attempt has of late years been made to revive the old theory of the aneurismal clot representing a secretion from the internal surface of the sac.

Sometimes, however, it happens that at some point the fibrinous layer is torn by the force of the blood, which, coming in contact with the membrane of the sac, forces a passage between the latter and the aneurismal concretion. Most frequently this detachment is only partial; the liquid blood then lifts up the wall of the sac at one point, and forms a second tumor on the outside of the primitive clot.

The successive stratifications of the aneurismal clot being defined by distinct lines of demarkation suggest that they were formed at different periods in an intermittent manner, depending very probably, as Broca likewise suggests, upon the particular state of the blood, or special diathesis, of the patient at the time of their deposition.

As already remarked, the fibrinous deposit depends upon the slowness with which the blood is renewed in the neighborhood of the wall of the sac, but this slowness itself depends, according to Broca, upon the relative dimensions of the sac and its orifice. If the orifice is large and the sac narrow, then the blood does not sufficiently stagnate to coagulate. Generally, the orifice of an aneurism presents little variation during the development of the tumor; it may become more rounded, more smooth and regular, without growing much larger; in all cases its dimensions are much more permanent than those of the sac, which, on the contrary, has a tendency to grow continually, so that, after some time, its capacity may be doubled, tripled, and much more. In the beginning, while the orifice is relatively large enough to maintain an active circulation within the sac, there is no tendency to coagulation. But in the measure as the sac enlarges, the circulation becomes slower, and the time finally arrives when the renovation of the blood is too insufficient to keep the fibrin in a fluid state, and when the latter will be deposited upon the wall of the aneurism in the form of a regular layer.

As soon as the fibrinous layer has attained a certain thickness, the capacity of the aneurism is proportionately diminished. The conditions of the aneurismal circulation are then the same as when the tumor was smaller—that is, when the relative dimensions of the sac and its orifice allowed the blood to be renewed at a sufficiently rapid rate to prevent its coagulation. The deposit of the active clots, therefore, cannot take place indefinitely; it must necessarily cease at a certain time, when the solid layers of which it consists have attained a certain thickness, which ranges from 1 to 2 mm.

But the aneurism enclosing the fibrinous layers has, therefore, not lost its other characters; it continues to pulsate, and has a constant tendency to grow. The active clots, constantly compressed, become thinned and condensed; the wall of the sac, though strengthened by the solid deposit, gradually yields again to the pressure of the waves of the blood, and the sac enlarges by degrees as before, and arrives at those conditions under which the circulation becomes too slow for keeping the fibrin in a fluid state. Then a fresh deposit takes place upon the preceding one, and so forth. In this manner the advancing growth of the tumor gives rise to the formation of fibrinous layers differing in age and density.

The above theory explaining the conditions under which, and the manner in which the aneurismal clot is formed, appears on the whole rational. Being, however, solely based upon macroscopical examinations made on fresh clots, I may venture to say that a more critical examination of hardened clots, especially if made with the aid of the microscope, will reveal details of such a nature as to throw some doubts upon its correctness. If the various fibrinous strata of which the clot consists were as simply and regularly deposited upon each other, as is generally supposed, the whole formative process, indeed, would be easily explained; for, then, layer upon layer would be deposited in regular succession upon the entire internal surface of the sac or tumor until the clot would have attained a certain thickness, when, by yielding to the pressure of the blood, it would, as Broca correctly asserted, expand to make room for fresh deposits. Furthermore, the deposition of fibrin, depending upon the retardation of the aneurismal circulation, would render it equally obvious that the fibrinous strata should attain a greater thickness in the fundus of the sac than in the vicinity of its orifice, and that, for this reason, these layers, upon a section, should appear to a certain extent crescent-shaped in their outlines, such as they are generally represented in works on surgery. But, for the deposition of fibrin to take place in such a regular manner, it would also be necessary that the direction of the current of blood entering the aneurism should always be toward the centre of the cavity, in order to exert an equal pressure upon every part of the internal surface of the latter; and, moreover, the aneurismal cavity should be free from any passive clot, such as Broca asserted to be the case. Whether this assertion is correct we shall examine hereafter.

At different times I have had opportunity of examining the fibrinous clots of some unusually large aneurisms. Although in these cases the examination was made on the clots in their fresh condition, I was, already then, struck with the apparent irregularity in the arrangement of the fibrinous layers, which rather deviated from the typical concentric order of general description. But as, at that time, my attention was chiefly directed to the pathological condition of the wall of the vessels, I neglected to inquire more closely into the cause of this deviation. When the present case of femoral aneurism, however, was presented to me, the idea occurred to my mind to harden the whole clot, and to study its composition more minutely on thin microscopical sections stained with some coloring material. After removing the coagulum of blood filling up the cavity, and then dividing the hardened spheroidal clot, I observed an arrangement of the fibrinous layers differing very considerably from the type generally described.

The fibrinous clot in this case was, as already stated, enclosed in a very thin sac of a loosely arranged connective tissue, most likely derived from the adventitia of the vessel. Besides the fibrillar bundles of this tissue, which the microscope easily revealed, the membrane also consisted of an embryonal tissue of small spindle-shaped cells with longer or shorter processes, appearing to fill up the areolæ left by the old tissue of the sac.

Upon the section of the clot the arrangement of the individual fibrinous layers appeared very irregular—a circumstance which renders it necessary to describe the latter as consisting of three sets of strata formed at different periods,

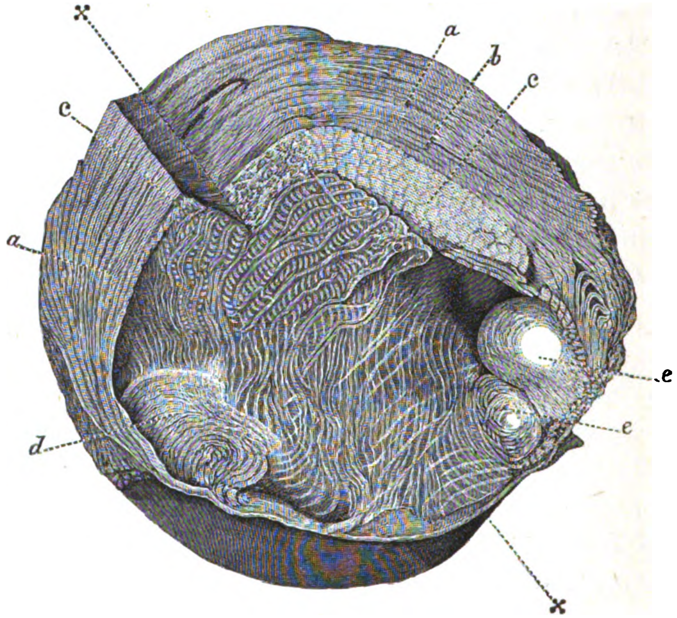

FIG. 1. SECTION OF THE FIBRINOUS CLOT.

and to make some explanatory remarks regarding the periodical growth of the tumor, before proceeding with the description. From the different degrees of density and color of the individual strata, as well as from their arrangement, it appears, namely, that when the original tumor had attained a diameter of about 2¼ inches, it became separated from its sac at *a*, Fig. 1, allowing the blood, as Broca already showed, to pass between it and the latter. In this manner one-half of the thickness of the wall of the tumor was formed. The layers, however, constituting the outer part of the latter (outside of *a*, Fig. 1) do not all extend around the whole surface of the original one, but cover this primitive deposit, with the exception of those resting immediately upon it only partially, some of them scarcely one-half. Their margins, overlapping each other, are well defined, as may be seen upon the drawing. Some of the layers overlap in regular succession, showing that the wave of blood giving rise to this deposit came from one and the same direction, while the overlapping margins of others point to an opposite direction, indicating that the wave from which they were derived have come from another side. These layers, measuring at their thickest part from 2 to 3 mm. in thickness, are each individually composed of a number of still thinner fibrinous strata, scarcely 1 mm. thick, which, however, are not always arranged in a strictly parallel manner, but run in a slightly oblique direction, appearing as if each succeeding stratum had slightly displaced its predecessor (Fig. 1). Thus it will be seen that their arrangement is not concentric in the true sense of the word, but rather imbricated, and should, therefore, not be compared with the arrangement of the pellicles of an onion, as is usually done, but rather to the imbricated arrangement of the leaves of the corolla of some flowers, as, for instance, those of a rose. The imbricated arrangement of these strata is well observed on the outer surface of the tumor, where, in some places, their margins do not completely overlap, leaving some of the lower strata exposed.

As regards the color of the different layers of the whole tumor, it proved in this case of aneurism to be the reverse from that ordinarily described; for here, it is the older and harder layers, representing the wall of the primitive clot, which present the darkest color, while the more recent external, but especially the softer and most internal layers, appear much lighter. The color of the individual strata, however, depends more upon the amount of hæmoglobin which they contain, than upon their relative age.

In examining the drawing, Fig. 1 (natural size), a fibrinous deposit (*b*), consisting of a number of thin strata, will be observed between the primitive deposit (*a*), already mentioned and the thick internal layer (*c*). This layer presents upon the section the form of a long wedge, and extends only through one-half of the whole tumor. The manner in which it was wedged between the older outer and the more recent inner layers appears somewhat obscure, but may be understood by the explanation of the mode in which the layers are formed, which I shall give hereafter. The most internal layers of the tumor (Fig. 1, *c*) are, as the drawing shows, very irregular in thickness, extent and arrangement; indeed, the latter is so peculiar as to render its description quite difficult.

In examining the surface of the irregularly shaped cavity upon the drawing, a number of prominent wave-like ridges, about $\frac{1}{32}$ of an inch in thickness and running parallel to each other will be observed. The interspaces by which they are separated from each other are about $\frac{1}{8}$ of an inch, or less, wide, and represent grooves or furrows marked by small, transverse and crescent-shaped ridges. The first, or long wavy ridges, are each divided by a fine groove into two parts, indicating that each ridge belongs to two distinct but adjacent fibrinous strata, and represent the margin of separate deposits, while the short crescent-shaped transverse ridges in the grooved interspaces represent the margins of underlying strata, crossing the former nearly at right angles. This crossing of the ridges is most distinctly seen in some part of the surface of the cavity, while in another the regular parallelism of the wavy ridges is more or less disturbed;

in some places, even, the crossing ridges appear almost as if interwoven. But even here, still finer ridges in the quadrangular interspaces, running parallel to some of the larger ones, may be observed. In one place of the cavity the surface forms an irregular round elevation of a smoother appearance than the rest (Fig. 1, *d*); but upon this smoother surface, even, fine ridges, describing curves or arches crossing each other, may be observed. Near the orifice of the aneurism the cavity is deepened, corresponding to a tuberosity on the outer surface of the tumor, which, very likely, had fitted the depression between two neighboring muscles. This part (Fig. 1 and 2, *e*), smoother than the rest of the cavity, and nearly flat, is divided by a groove into two parts, and appears set into the cavity as a stopper is set into the mouth of a bottle. But, even here, the surface is marked by distinct fine concentric ridges, crossed by others radiating from its centre.

In examining, now, Fig. 2 (natural size), representing the surface of a section made of Fig. 1, in the direction of the two crosses, we will obtain a clearer idea of the peculiar arrangement of the innermost layers of the tumor by observing that the individual strata—seen in Fig. 1, in the form of long, wavy and grooved ridges, of which the transverse section is here exhibited—are continuous in their extent, but actually composed of irregular columns adhering more or less to each other (Fig. 2, *c*). They differ in their diameter, but are almost all marked by a little depression in the centre of their sections, indicating that there exists some difference in the central and in the peripheral part of their substance. But, in examining the outer layers (*a*) upon the same section, the deviation from the parallel or concentric arrangement will be found still greater than was observed in Fig. 1. In the thicker portion of this section, representing the fundus of the tumor, the boundaries of the fine strata appear to be lost; the strata, themselves, running in irregular curves around a small cavity contained in the walls of the tumor. Lower down, toward the orifice of the clot, the individual layers are distinguished again by darker lines. But here, they also show, like the most internal layers of the tumor, a columnar arrangement, indicated by the polygonal fields seen upon the section (Fig. 2, *f*), and recognized by the lighter and darker shading, the latter representing the periphery. In this part of the tumor, however, the columns are fused with each other, and do not admit a separation. The most external layer (*g*) is distinguished by dark borders, and consists, apparently, of fine parallel strata, but is, in reality, as will be seen directly, formed and composed in a similar manner as the preceding.

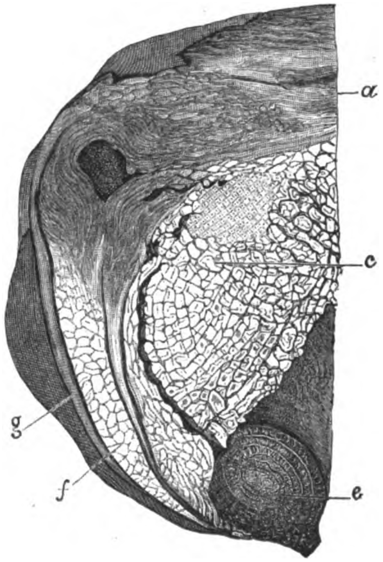

FIG. 2. SECTION OF THE FIBRINOUS CLOT.

Let us now examine a little closer into the nature of these fields or columns, mapped out upon the section represented by Fig. 2, by studying a thin microscopical section taken from near the orifice of the tumor in the neighborhood of *f*. In comparing Fig. 3, representing this section, with Fig. 2, the exact locality upon the latter, from which the former was taken, will be easily recognized. But before proceeding further, a few remarks relating to the staining of these sections will be necessary. The first sections made from this aneurismal clot I had stained with carmine; this coloring agent, though bringing out every minute detail of the structure of the clot, nevertheless failed to show sufficiently distinctly the colorless blood-corpuscles which it contained. For this reason I subsequently put the section in a weak solution of hæmatoxylin, which has the property of being taken up first by the nuclei before it is absorbed by the rest of the tissues. The same took place here; for, after having the sections only a short time in the hæmatoxylin solution, the nuclei of the colorless blood-corpuscles were found to be stained intensely, and the protoplasm, if stained at all, pale blue; while, on the other hand, the rest of the section, es-

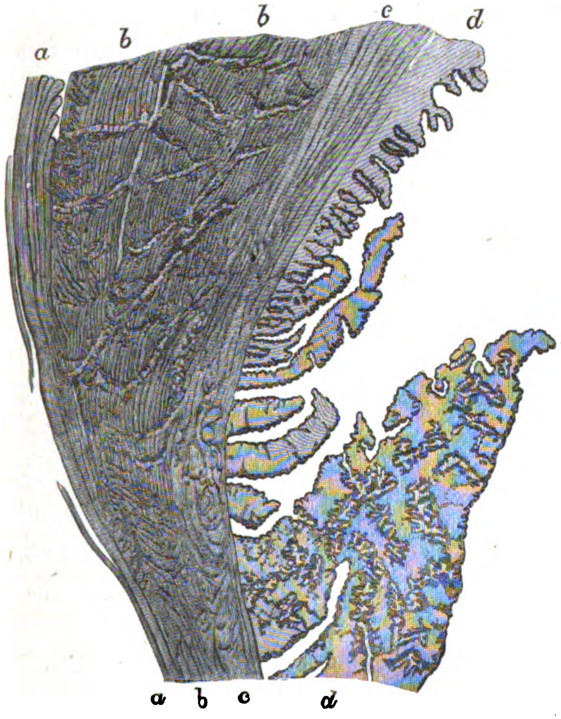

FIG. 3. MICROSCOPICAL SECTION TAKEN FROM NEAR THE ORIFICE OF THE TUMOR.

pecially the older and denser layers, presented a purplish color, produced by the mixture of the carmine and the hæmatoxylin. But as the blue color in the section was chiefly owing to the intense staining of nuclei of the colorless blood-corpuscles, the relative quantity of the latter, contained in the different parts of the section, could be determined by the degree of the blue it presented. With these explanatory remarks, we may proceed to study the thin section represented in Fig. 3, and magnified nearly 6 diameters.

In examining the drawing, the individual layers of this portion of the clot, with regard to their respective age and density, will be easily distinguished, especially when compared with Fig. 2. Thus it will be found that the portion marked *a* represents the external older and denser layers. These, besides holding a smaller quantity of colorless blood corpuscles than the more recent layers, appear to have a greater affinity for carmine, in consequence of which this color here predominates over the blue. The next layer (*b*), in which the blue slightly predominates, must be of a more recent formation, and represents that portion of the section (Fig. 2) above described as exhibiting those irregular polygonal fields mapped out upon it, while *c* represents a denser and older layer; and, finally, *d*, a portion of the most recent, internal layers, above described.

In comparing, now, these four different layers with each other, it will be found that they present one characteristic feature in common—namely, by being in no way composed of *continuous concentric* subordinate strata, such as the present theory concerning the composition of aneurismal clots teaches. On the contrary, it will be seen that each of these layers, which, in the fresh condition, and by a superficial examination, appears to the naked eye as extending parallel with the wall of the sac throughout the whole tumor, is, in reality, composed of a number of smaller portions, which, even in the older and denser layers, may be easily distinguished.

At first sight, it must appear very difficult to explain this complicated composition of the aneurismal fibrinous clot, deviating so extensively from the old venerable theory of the parallelism and concentricity of the fibrinous layers; and, I must confess that, when microscopically examining the first thin sections taken from the outer layers of the section represented in Fig. 1, and observing the minute wavy bundles of fibres, comparable to the rippled waves of the ocean, such as are seen in Figs. 4 and 5, I was quite astonished at the phenomenon which I beheld, for though my views concerning the formation of the more recent inner layers of this tumor (Fig. 1, *c* and *d*.) was already formed, I regarded it as an exception, and still imagined the outer layers as being formed by a deposition of successive strata, overlapping each other. The first explanation which I could think of was, that these waves might be owing to a displacement of the thin fibrinous strata, caused by the force of the aneurismal current of blood; but, though this appeared reasonable, as far as the formation of the waves was concerned, it failed to account for the minute bundles of fibres of which the layer appeared to consist. My idea of the true formation of the fibrinous clot, therefore, remained undefined, until I determined upon cutting that portion of the clot represented by Fig. 1 at right angles—that is, in the direction of the line indicated by the two crosses—in order to examine the transverse sections of those wavy ridges, forming the most internal layer. The examination of this section, then, showed me the tracings of those fields and columns upon the older and outer layers, described above and represented in Figs. 2 and 3, but which, moreover, I had already observed with the aid of a strong loupe, though not as distinctly as here, upon the older layers of the first section (Fig. 1, *a* and *b*). Thus the faint idea, already impressed upon my mind, that not only the recent, but also the older layers, were composed of columnar deposits, assumed a more definite form, and its correctness was corroborated by my subsequent studies. To render a final explanation of the formation and construction of these layers satisfactory, however, we must once more return and microscopically examine the thin section represented in Fig. 3, commencing with the most recent inner deposits (*d*) which in this drawing appear in their transverse section.

In examining these inner and most recent layers with an amplification of from 300 to 400 diameters, we find them to consist of pure unaltered fibrin, characterized by its finely fibrillar net work. A considerable number of colorless blood corpuscles are found embedded in the meshes of this network throughout the whole deposit, but still more along the border, where they are so numerous as to almost fill up every mesh, and to give rise to the more intense blue coloring of this portion of the section, represented by a darker shading in the drawing. The meshes of the fibrinous network (Fig. 6, *a*), measuring from $\frac{5}{600}$ to $\frac{6}{600}$ mm. in diameter, closely resemble in form and other characters those of freshly coagulated fibrin throughout the whole deposit, giving the latter a homogeneous appearance when the section is examined with a strong loupe. With the exception of the increased quantity of colorless blood corpuscles, therefore, the inner layers of the clot do not deviate in their structure from that of fresh fibrin.

In examining next the middle layer (Fig. 3, *b*) of this section, we observe already with the naked eye a certain striated appearance, which, by the examination with a strong loupe, is found to be caused by apparently parallel bundles of fibres, of which this layer appears to consist. Examined under the microscope with a still higher magnifying power of about 50 diameters, these bundles are resolved into apparently individual fibres, running parallel to each other, but interrupted at short distances by light zig-zag-shaped, transversely or obliquely running bands, seen in Fig. 5. This fibrous arrangement is observed in all sections without regard to the particular locality of the tumor from which they are taken (Figs. 3 and 4, magnified 6 diameters). Distributed between the fibres, a considerable number of black dots, representing the stained nuclei of colorless blood corpuscles, are observed throughout the section (Fig. 5), but, particularly, and more closely placed, upon the border of the light, ribbon-like portions. These fibres, however, as the drawing shows, are not equal in thickness throughout their course, nor can they individually be traced for some

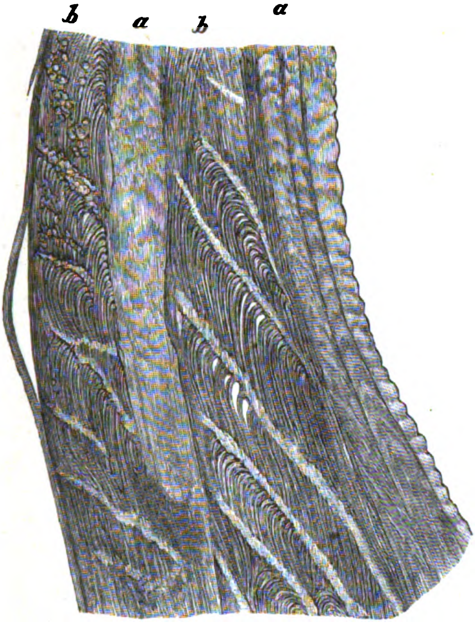

FIG. 4. SECTION OF MIDDLE LAYER.

distance, but, on the contrary, appear to pass each other, a phenomenon which explains itself when examined with a still higher amplification from 300 to 400 diameters. It will then be found that these apparent fibres represent more or less oblong meshes of the fibrillous network of the fibrinous layer (Fig. 6, *b*) stained by the carmine, while the uncolored portions between them are crossed by single unstained fibrillæ, or by rounder meshes of the network. The bundles formed by these pseudo-fibres are held together in the same manner. The zig-zag bands, though only faintly colored, and of a more homogeneous appearance, nevertheless consist also of fibrin, the meshes of which have remained unaltered and contain no colorless blood corpuscles.

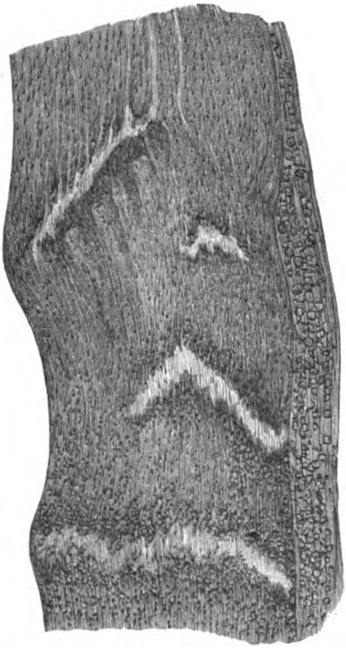

FIG. 5. SECTION OF MIDDLE LAYER.

In the older and denser layers, such as Fig. 3, *a* and *c*, and Fig. 4, *a*, the meshes are found still more elongated (Fig. 6, *c*) and the pseudo-fibres lying closely to each other. But even in these layers the traces of those bands interrupting the course of the latter will still be found. The nuclei of the colorless blood corpuscles found in the layers thus far mentioned are round in form. There are, however, some thinner strata here and there observed, especially near the inner surface of the original sac, in which the meshes are still more drawn out and more intensely colored by the carmine, while at the same time they appear to possess a greater density (Fig. 6, *d*), so that they might be taken for long spindle-form cells, if a closer examination with a high power did not reveal the original meshes of the fibrin. In these layers, also, a number of slender spindle-form nuclei were met with, though the greater part of these bodies had preserved their round form.

The older layers contain, as already mentioned, but a comparatively limited number of colorless blood corpuscles, manifested by their stained nuclei. This phenomenon was explained by the observation, made in some of these layers, of numerous small fatty patches, or globules, representing very probably the colorless blood corpuscles undergoing fatty degeneration, a process interfering with their being stained and becoming visible. In some of the older layers highly stained with carmine, on the other hand, a considerable number of round granular bodies, evidently identical with colorless blood corpuscles, were observed equally colored by this agent without showing any traces of nuclei. I am unable to explain the particular change which these bodies had undergone, as in all the other layers their protoplasm was generally found either feebly stained with hæmatoxylin or not at all, while their

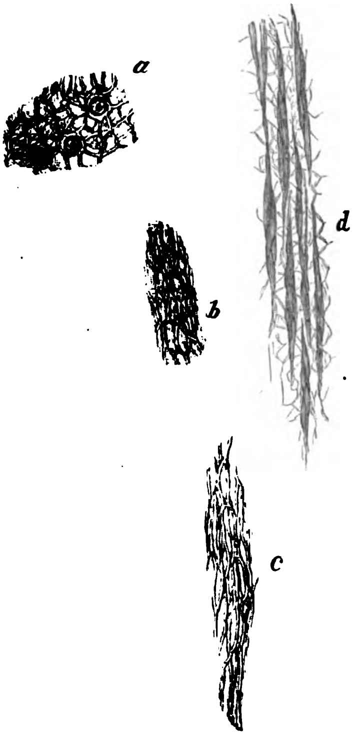

FIG. 6. SECTIONS MAGNIFIED FROM 300 TO 400 DIAMETERS.

nuclei always exhibited the deep blue of this coloring agent.

It has already been remarked that the darker color presented by some of the older layers is owing to the presence of free hæmoglobin. The colored blood corpuscles from which this coloring material must have escaped are not very readily seen; but if the section is very thin, they may also be detected with a first-class objective, usually pressed together in masses between the subordinate fibrinous strata, having assumed a hexagonal form by their mutual pressure.

After the above statement of the facts observed in the examination of the fibrinous aneurismal clot under discussion, we are prepared to deduct a harmonizing theory concerning the true mode of formation of this clot.

In casting a glance upon the innermost layers of the tumor (Fig. 1), it must become obvious that these layers *do not individually form continuous strata or lamellæ over the whole internal surface*, as they should according to the current theory, which, like Broca, teaches that the whole aneurismal cavity is filled with liquid blood pressed, by the entering aneurismal current, with each systole of the heart against the wall of the tumor in every direction, leaving there, in receding with the following diastole, a minutely thin deposit of fibrin, from which, by the constant repetition of this process, the formation of these thicker layers, perceived by the naked eye, took its rise.

It will be found, on the contrary, that the individual ridges and columns, particularly characterizing the innermost layers, must have been deposited by the free margin of a thin wave of blood representing the exact limit to which the latter had advanced, similar to the markings on the sand of the seashore, left by the receding tide. From the crossing of these ridges it may be furthermore presumed that these waves must have come from different directions. But waves as thin as these could not be formed without the presence of some solid or semi-solid body in the aneurismal cavity, between which and the internal surface tumor the blood were forced to pass. Such a body will be found in the passive clot, which is always met with in the cavity of sacciform aneurisms after death. Broca denied the presence of this clot during life, but regarded it as having been formed during the agony, or after death; but the facts, which the aneurismal clot under discussion presents, evidently contradict this assertion. I presume, therefore, that a passive clot exists in the aneurismal cavity during life, between which and the internal surface of the tumor the blood penetrates to a lesser or greater distance. This presumption is corroborated by the fact of coagula of blood being frequently found embedded in the walls of aneurismal tumors, which most probably represent smaller portions detached from the main passive clot, and surrounded by fibrinous deposits.

As far, then, as I can judge, the whole process, depending on various modifying circumstances to be mentioned directly, appears to take place in the following manner: In the beginning—namely, as long as the sac has not attained a certain size—and the orifice of the artery being sufficiently large, the blood may enter and leave the former without a passive clot being found, and, in harmony with the current theory, fibrin may even be deposited over its whole internal surface. But as soon as a disproportion takes place between the relative size of the sac and the orifice in the wall of the artery, a portion of the blood will be retained in the former, and lead to the formation of a passive clot, which enlarges in due proportion to the enlargement of the sac. Then the aneurismal circulation assumes the form of a thin wave, or sheet of blood, penetrating between the passive clot and the internal surface of the wall of the tumor. The changes which, in the course of the disease, may take place in the size, form, and other characters of the orifice in the artery, and in the walls of the latter itself—such as were found in the present case—together with the particular position of the body of the patient, may alter the direction of the current of blood entering the cavity in various ways. The elevations and other irregularities upon the internal surface of the dilated portion of the artery, as described in the beginning of this article, may even determine the blood to enter the cavity in the form of a whirl, sweeping around the passive clot contained therein.

As soon, then, as the blood has to pass between a passive clot and the internal surface of the sac the fibrin must become deposited in the manner which I have indicated above, leading to the successive formation of those ridges and columns, represented in their oblique, or tranverse section in Fig. 3. Between the formation of each columnar, or ridge-like deposit, a certain intermission, of course, must take place, the cause of which, however, not being essential to our discussion, I shall not stop to explain at present. These primary deposits will resemble in form and composition those inner layers represented in Fig. 3, *d*, consisting of pure fibrin, in the fibrillous net-work of which a large number of colorless blood-corpuscles are found embedded. These blood-corpuscles corroborate the theory that it is these bodies which, by their adherence to the wall of the tumor, give rise to the coagulation of the fibrin. In Fig. 3, *d*, these layers are represented separated from each other, the separation having occurred during the making of the section; in the natural condition, however, they are found slightly adhering to each other by the mutual pressure, derived from the constant pressure of the current of the blood, which they exert upon each other. Though at right angles with the internal surface of the sac when first formed, these deposits are subsequently pressed down by the onward current of the blood passing over them and depositing another series. And this inclination to assume a position more parallel to the surface of the cavity, strikingly illustrated by the innermost layers, *d*, in Fig. 3, increases with every new deposit formed upon them, which, in its turn, is also pressed down by the continuous pressure of the aneurismal current.

The same force causes a simultaneous stretching of these deposits, and, in consequence, gives rise to the enlargement of the tumor. But, as with the dimensive growth of the tumor the thickness of its wall increases by new deposits, the older layers become still more stretched, and thus gradually assume a position nearly parallel with the internal surface of the original sac. During this process, however, the borders of the original deposits, characterized by the presence of a greater number of colorless blood-corpuscles, as above stated, are never entirely obliterated, though the individual layers, themselves, may more closely adhere to each other; it is thus that they will always be recognized, even in the oldest layers, and that the appearance of the above-described fields and columns is produced (Fig 3).

With the gradual stretching of the deposits, the meshes of the fibrillous net-work of the fibrin must assume a more oblong form, which, in the oldest layers, as I have shown, even approaches that of a spindle-form fibre, a phenomenon which might lead to mistakes concerning the organization of the aneurismal clot; though I venture not to exclude the possibility of such an occurrence.

In concluding this article, I may add that when I commenced the examination of the aneurismal clot above described, I looked upon the peculiar formation of its inner layers as an exception to the rule, and as having only occurred in this particular case. But when in the progress of the investigation of the subject, I found that the more external and older fibrinous layers showed the same construction as those more recently formed, the idea that all clots of sacciform aneurisms were probably formed in this manner assumed a more definite form on my mind. But as the cure of an aneurism will ever depend upon the collateral circumstances of the case, relating to the local or general cause of the disease of the artery, peculiar habits and condition of the patient, etc., it is difficult to say whether an exact knowledge of the true mode of formation of the aneurismal fibrinous clot would have any practical bearing upon the treatment; though all scientific medical or surgical treatment should ever be based upon a true knowledge of the cause of the disease and the exact manner in which it is produced. The same with aneurisms. At any rate, a comparative study of the mutual relations existing between the mode of formation and construction of the aneurismal tumor might lead to beneficial results concerning the treatment, for which reason I would be pleased to see the attention of surgeons directed to this subject.

THE EFFECT OF GENITAL IRRITATION IN THE PRODUCTION OF NERVOUS DISORDERS (CONTINUED).

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OF BROOKLYN,

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WHERE a genital irritation is removed by operation, we have several factors at work that may be potent in effecting improvement. The patient usually obtains rest, as has been suggested by Dr. Shaffer, but this is usually short, in my own cases not extending over twenty-four or forty-eight hours, and is, therefore, obviously inadequate. An irritant is removed from an exquisitely sensitive organ, one so sensitive that the deepest stages of ether and chloroform narcosis must be reached before anæsthesia of it is produced. The profound impression upon the nervous system of etherization or chloroformization must be considered; those who have seen, as I have, an inveterate and unmanageable tic douloureux greatly relieved for two or three days by alcoholic intoxication, and other like phenomena, will not question this. Conjointly with this cause, inseparable from it as most of the operations are done, is the impression upon the nervous centres of the cutting or tearing or cauterizing of the operation itself. The more unstable, the more impressionable the nervous system be, whether from actual disease or from heredity, the more active will these three last factors be, particularly the latter two. I have seen a confirmed epileptic, having convulsions every day or two, of strong kleptomaniac tendencies, go for six weeks without a fit and not steal, after having had a depressed cicatrix removed from the scalp, the bone being sound beneath this cicatrix and no nerve being implicated in it. Our therapeutics takes too little account, in my opinion, of these impressions. Your nerve centre cannot itself be directly reached except by great violence. It usually lies deeply encased in bony cavities, and its only means of communication with the outer world is through nerve fibres. Precisely as the outspread panorama of a landscape passes to the cortical cells along the optic nerve; precisely as the music of an opera reaches the cerebrum upon the auditory nerve; precisely as the fragrance of flowers steals inward through the olfactory nerve; so, in the same manner, do the differences in barometric and thermometric pressure, and cutaneous and visceral impressions of any kind make themselves known to the central ganglia by way of the sensory spinal and cerebral nerves.

For what other reason do we slap or dash water upon a new-born babe who fails to make the usual respiratory movements? It is well known to physiologists that a frog can be killed by a smart blow upon the belly. When a man becomes livid, pulseless and dazed from a bullet-wound, before hæmorrhage has had time to do its work, it is the nervous centres that are shocked by the peripheral violence. When gun-shot wounds induce disturbance in distant nerves, as has been shown in the celebrated circulars of Drs. Mitchell, Morehouse, and Keen, they act through the medium of the central ganglia. This impression upon nervous centres is a factor, and an important one, throughout the whole extended range of the complex phenomena of life. It is inseparable from the action of all drugs, whether they be brought in contact with the alimentary canal, with the skin, or with the subcutaneous tissue. Who has estimated its relative performance in the effects obtained from cathartics, from cholagogues, from irritants, from sedatives, from stimulants, from tonics, from electricity? Who has told us what part it plays in change of locality, not merely from one climate to another different one, but from one neighboring town to another, or even in the removal from one story of a house to another, such as occasionally gives relief to asthmatics? Wherever there be nerves of sensation, there we *must* have it; and, in neglecting it as we have done, we fail to make use of a rich and well-worked mine of material lying ready to our hand.

The fact that operations upon the genital organs will, for the time being, ameliorate the symptoms of organic lesions should make us cautious in accepting the conclusions to which we would otherwise be naturally led by the cases of Mr. Bryant and Dr. Otis. Although we must omit one instance narrated by Dr. Otis of a patient of M. Brown-Séquard, who was cured of symptoms of cerebral softening by circumcision, yet, undoubtedly the proof submitted by him and Mr. Bryant is unimpeachable in demonstrating that the removal of a phymosis, adherent prepuce, irritable clitoris, and urethral strictures will often relieve urinary incontinence, retention, intermittent and painful micturition, priapism, and a host of unclassifiable nervous symptoms, more especially in children. But, as these cases do not seem to have been thoroughly examined for organic nervous disease or other causes, and, furthermore, as their histories after the operation do not usually extend over a month or two, the data are wanting upon which any man can judicially formulate an opinion that these might not have been cases of organic nervous or other disease, improved for a time by cessation of genital irritation.[1] Notwithstanding that Mr. Bryant would seem in his cases to have carefully excluded the possibility of stone or disease of the bladder, there is no evidence that Dr. Otis has considered these causes, and of both Mr. Bryant and Dr. Otis we may ask whether their patients had highly acid urine, or nephritis, or spastic disease, or meningeal troubles, especially the tuberculous, or spondylitis, or organic disease of any kind, or were of a neurotic heredity. To illustrate the facility with which even an alert observer can be misled in regard to deductions of this nature, I may perhaps be pardoned for the recital of the following case of Dr. S. Weir Mitchell, at the same time expressing my regret that the length of this paper forbids me giving the details in full.[2]

L. P., male, æt. 6, a strong, healthy-looking child, whose father had had syphilitic accidents. No trouble in teething. Had had malarial fever, yielding to quinine. Was not quite well from this date, though no special disease apparent; was indisposed to action, lacked appetite, and woke often with a cry. A little later complained of stomachic pain, and two days after passed a large ascaris lumbricoides. Was given a vermifuge. On evening of same day fell down, had slight facial spasm, and became unconscious. On being roused after two hours of semi-coma, slight plosis of left eyelid and partial motor paralysis of both legs were observed. Salines and vermifuge again ordered, causing expulsion of four worms and much slimy mucus; and thereupon he began to move legs freely and could stand with slight aid. During the next month he passed several worms, and at the end of this time was as well as usual, except a slight limp and slight ptosis. Dr. Mitchell at this time deemed it to be a case of palsy from worms. Remained improved for six months, *when he had a series of convulsions without apparent cause, ending in a much more complete paraplegia. Former vermifuge treatment had now no effect in expelling any more worms, "yet a persistent purgative course so far improved the boy that in three weeks he could stand, holding fast to a chair.* During the summer and spring he took iron and quinine, and was some time at the seaside. These measures completed his recovery so far, that "he seemed to me better than at any time since the first attack." Eight months after he had the convulsions again, followed by coma and motor and sensory paraplegia, the sensation improving in time, but not the motion. The former means of treatment now failed entirely, and no worms were discharged. Three years later he was in this same condition, and died of dysentery, two and a half years after this final attack of paralysis.

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[1] Dr. E. C. Spitzka writes me that he has seen the prepuce in some way anomalous in eight cases of infantile spinal paralysis, and in all cases of paralysis from spinal disease in male children, and makes the interesting suggestion that it may be only one effect of the generally defective development.

[2] Op. cit.

I am not prepared to deny that reflex paralysis may not occur from other cases than phymosis, adherent prepuce, irritable clitoris and meatus, and strictures. Nonat had under his care a young, unmarried woman, in whom intra-uterine cauterization repeatedly produced loss of consciousness with momentary paralysis of the lower limbs, on one occasion even a complete anæsthesia of them. Echeverria, applying a mild faradic current to the cervix uteri for metrorrhagia, produced severe pain in the pelvis and lower extremities, tremor and numbness in the limbs, general perspiration and paralysis of the lower limbs, not completely recovered from until fourteen hours had elapsed. The secretion of milk, having ceased for five days, was reëstablished.[1] I think I have seen a para-paresis produced in a little child by lying through the night on a rubber cloth, which had induced profuse perspiration, and it was relieved in a few hours by the withdrawal of the cloth; but I have no notes of the case, which occurred some eight years ago, and I may possibly be mistaken. We certainly know that reflex paralysis can be experimentally brought about in a limited way on the lower animals. Lewisson has produced paralysis of the hinder legs in rabbits by squeezing the kidney that had been laid bare, as well as by pinching the fore legs, or even by so slight a cutaneous impression in a frog as a rubber ring placed around the neck; this loss of power ceasing upon the removal of the cause, and, in addition, the discussion that has been waged of late years in regard to the existence and nature of inhibitory nervous actions has demonstrated that impressions upon certain nerves can restrain the action of others. Nothnagel,[2] for example, by gentle pressure upon the sciatic nerve stopped the strongly tremulous movements in the hind legs of a dog whose spinal cord had been severed in the dorsal region, and who had been suspended in the air. Strong pressure increased these movements. Tschirjew[3] temporarily abolished the tendon-reflex of the quadriceps extensor by lightly raising the crural nerve on a string.

The practical deductions from all these facts and reasonings are of great importance to us as scientific and conscientious practitioners. We should never, in any case, unless the future supplies the links in the chain of evidence that are as yet wanting, assume that nervous symptoms are due to a co-existing genital irritation. We should, in all such instances, carefully search for other causes, and it will be our imperative duty to do so in paralysis. We should examine for urinary acidity, stone, cystitis, nephritis. We should search for organic disease, as meningitis, particularly the tuberculous, spondylitis, tetanoid paraplegia, epilepsy, as well as for neurotic heredity and tendencies. But the genital irritation should be always removed, as we remove any other peripheral irritation. In regard to this particular point, Dr. William M. Mastin, of Mobile, sounds a warning note, which we shall do well to heed.[1] His father, Dr. C. H. Mastin, calls attention to the general, if not universal, prevalence among the Jewish males of contracted urethral meatus, which he attributes to their habit of circumcision, and the textural changes induced in the glans by the loss of the covering prepuce, analogous to the occlusion of the lacrymal puncta and incurvation of the tarsal cartilages in entropion. We should therefore be careful not to deprive the glans of its natural præputial shield to a greater extent than is absolutely necessary. Dr. A. Jacobi states to me in a letter that, after the adhesions have been broken up, he has succeeded, in a number of cases, in easily dilating the præputial orifice; and it will certainly be advisable to make use of this suggestion. In view of Dr. Mastin's assertions, we should be cautious about doing any other operation than for the removal of an irritation, although I believe that any operation upon the genitals will often have a beneficial effect for a longer or shorter time, and that therefore it may be proper to practice it, when the possible relief may counter-balance in importance the probable resulting stricture of the meatus.

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[1] Both these cases are related by Echeverria, *N. Y. Medical Journal*, vol. iii, 1866, p. 98.

[2] Beobacht über Reflexhemmung, *Arch. für Psych. u. Nervk.*, vi, S. 332, 1875.

[3] *Arch. für Psych., u. Nervk.*, viii, Hft. 2, and *Berl. Klin. Wochenschr.*, No. 1, 1878.

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[1] ANNALS OF ANATOMY AND SURGERY, Vol. iv., No. 3, September, 1881.

I believe, then, that I am justified in asserting:

1. That there is no proof that genital irritation can produce a reflex paralysis.

2. That while it is probable that slight nervous disorders, as incontinence, retention, difficult nucturition, erratic movements, and slight nervous disturbances can be produced by genital irritation, the proof is not yet complete.

3. That operations for the removal of genital irritation may be beneficial even in organic nervous disease.

4. That we should, therefore, remove such genital irritation, if it exist in any case whatsoever, and thus give our patients the benefit of the doubt.

5. That in all cases of nervous disorders, with accompanying genital irritation, we should not regard the latter as the cause of the former until all other probable or even possible causes have been rigidly excluded.

6. That operations upon the genitals, even when there be no genital irritation, may prove to be an useful therapeutic measure in certain cases.

Since the reading of this article, the New York *Medical Record*, in its account of the ensuing debate, has published some hitherto unpublished cases of Drs. Sayre and Seguin,[1] the details of which were not mentioned in the discussion. The first patient of the former gentleman had phymosis, præputial adhesions and also great weakness of the eyes. He was circumcised, and adhesions removed. It is said: "At the end of one month he was perfectly well." Dr. Knapp, in a letter which is given, writes: "His sight after operation had materially improved, both as to acuteness and capacity for prolonged use. He has still incomplete atrophy of the optic nerves, and moderate amblyopia." This, therefore, adds another, and a very interesting, case to those already cited in demonstration of the fact that operations upon the genitals will be beneficial in organic disease. Dr. Sayre adds four more cases:

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[1] November 19, 1881, p. 576.

CASE 1. Æt. 31. Began walking when about one year old. No trouble till twenty months old, when he became nervous, moving hands and feet in a peculiar way, and making a strange noise. Passing water relieved these symptoms. Would sit still all day in a chair if left to himself, without noticing anything, or attempting to speak. Gait unsteady, fell easily. Prepuce elongated, orifice very small. Circumcision, adhesions torn away. Symptoms disappeared, and had not returned fifteen days after.

This patient was manifestly not under observation long enough to prove anything.

CASE 2. Æt. 6½. Partial paralysis of legs. Constant erections. Adhesions firm; they were removed August 20. On October 10 heard by letter of great improvement, and that legs could be extended or flexed without any effort.

Proof defective because fifty-one days is not long enough time for observation, and because we are not informed as to who wrote the letter or how accurate an observer he or she was. Some cases of epilepsy are reported in a letter to have been free from fits since removal of adhesions, but no details are given, and we are not told how long they were relieved.

CASE 3. Æt. 18 months. Paresis of lower limbs. Adhesions firm, meatus red and granular. Adhesions removed. About one month after child well.

Time of observation inadequate.

CASE 4. Æt. 3½. Partial paralysis and atrophy of left leg, dating back to his twelfth month. Phymosis. Circumcision. Six months afterward child very much improved.

We are not told as to whether he had any other treatment in the interim; but certainly this looks like a case of organic disease, possibly myelitis of one anterior cornu, or neuritis, improved by circumcision, like my own case.

In the course of the debate, Dr. Sayre remarks: "Dr. Gray had intimated that in one case an apparent paralysis existed only because of the exquisite tenderness of the parts, which friction of the clothes increased. But if so, why could not the child move, as he could not, when perfectly naked?" This allusion was to case 1 of Dr. Sayre's original paper; and my answer to his question will be found in my comments, which he seems to have misapprehended, on that very case. A child, who had undergone the torments of this one, would very naturally not return to a normal condition upon a momentary removal of *one* irritating factor.

As my friend, Dr. Seguin, was not present at the reading of my paper, I fear that he was not fully informed as to the precise points that I attempted to establish, for his cases are confirmatory of my views. A running analysis of them will make this plain.

Case 1. Æt. 18 months. Urinary incontinence of several months. Much elongated prepuce. Circumcision, January 15, 1876. Perfect relief to present date.

This is excellent proof of the removal of urinary incontinence by circumcision, but it is not stated that there was any genital irritation.

Case 2. Æt. 8. Urinary incontinence for several years. Elongated prepuce and adhesions. Circumcision, April 16, 1880. Marked improvement one month after; then strychnia given and continued; at present well.

Improvement apparently due to operation; who can tell how much of cure due to strychnia?

CASE 3. Æt. 10. Constant pain in popliteal space, marked paresis of legs, headache, palpitation on least exertion. Adhesions extending to mouth of urethra broken down, April 15. June 22, perfect relief.

Subsequent history not extended enough to be conclusive.

CASE 4. Boy, æt. 19 mos. Cannot walk, standing difficult, head thrown back. May 6th, adhesions removed. May 20th, marked improvement, *although adhesions* had *re-united;* they were again removed. August 20th, child walks readily.

As re-union of adhesions did not prevent marked improvement, this latter must have been due to something else than the removal of adhesions, possibly to the operation, etc. History does not extend beyond fifty-eight days.

CASE 5. Boy, æt. 2. Great muscular debility of lower extremities. Prepuce elongated. Circumcised June 21, 1880. Improvement, but "this case has required constant care to the present time."

No proof here that paresis was due to phimosis, or was markedly benefitted by it.

CASE 6. Æt. 3. Cannot walk readily. Urinary incontinence. Removed adhesions and large amount of smegma, July 29, 1880. October 18, no return of incontinence. Walks much better.

As the walk was still defective nearly three months after the operation, it looks as if this defective walk and incontinence were both due to organic disease, and that one of these symptoms had been relieved, at least temporarily, by removal of adhesions.

CASE 7. Boy, æt. 6. Very backward in walking, now weak in lower extremities; urinary incontinence and inguinal hernia. August 5, 1880, adhesions and large amount of smegma removed. September 6th, much stronger, no return of incontinence.

The remarks upon case 6 will apply here.

CASE 8. Æt. 2½. Unable to stand; very little power in legs. September 23, circumcision and removal of adhesions. October 31, child runs around readily.

History extends only over forty days.

CASE 9. Æt. 2. Paresis lower extremities, drags legs in walking. August 16, adhesions broken down. August 23, walks without dragging his legs. September 27, circumcised. October 4th, marked improvement. Gaiffe's battery was applied, and stated to have been beneficial.

Removal of adhesions caused improvement; so did circumcision, although it is not said that it was necessary to remove any genital irritation; so did Gaiffe's battery; and, after all, it is not claimed that a cure resulted. This would seem to be good proof that organic disease can be relieved by nervous shocks like operations and faradic currents.

CASE 10. Æt. 2. Stumbles easily, slight talipes. Circumcision and adhesions removed. Marked improvement.

No proof that genital irritation acted as cause.

CASE 11. Boy, æt. 3. Unable to stand; laryngismus stridulus. Circumcision. One week after could stand by a chair. "Improvement was continuous and rapid."

As length of time of observation is not given, no conclu-clusions can be drawn.

CASE 12. Boy, æt. 1. Marked paresis whole left side, which is not as well developed as the right. Drags left foot in crawling, and has had frequent convulsions. Circumcision and removal of adhesions. Electricity used. Three weeks later much better use of extremities, and "the improvement continued."

This looks very much like a case of organic disease benefited by circumcision and removal of adhesions, and electricity.

CASE 13. Boy, æt. 11. Urinary incontinence. Adhesions removed. No improvement.

Case requires no comment.

CASE 14. Boy, æt. 4. Severe talipes equino-varus. Tendo achillis cut, and foot brought into position. About four months after circumcision for an elongated prepuce, and adhesions removed. Brace and electricity, used improvement rapid and excellent.

Tenotomy, circumcision, removal of adhesions, brace, and electricity—who can tell to which was due the improvement?

CASE 15. Æt. 4. Incontinence of urine. Circumcision and removal of adhesions. Perfect relief.

How long was this relief maintained?

CASE 16. Boy, æt. 13. Convulsions almost continually; sometimes forty or fifty in the twenty-four hours; easily excited, and would occasionally be almost uncontrollable. Prepuce elongated and adherent. December 15, 1880, broke down adhesions. January 11, 1881, day attacks recurred very rarely, night attacks much less severe. Circumcision October 23, 1881. For a while after no convulsions for week or more at a time; then they returned occasionally at night, and for this bromide of potash was given. Now goes to school regularly, and excellent reports are given of his behavior and progress.

This seems to have been a case of organic disease improved by one operation which probably removed a genital irritation, then by another operation which is not said to have been necessary for genital irritation, and finally, by the bromide; but yet, as this history must have been written in the early part of November, about a week or two after the last operation, and about the time it was found necessary to commence the bromide, the case contains no proof that the convulsions were due to the genital irritation or was improved by the operation.

CASE 17. Boy, æt. 6 weeks. "He had never had a good night's rest since his birth, and had to be drugged to secure the least rest. Cried almost incessantly night and day. Legs were in constant motion, penis was in a state of priapism. As soon as it was touched the convulsive movements were augmented in severity and rapidity." On crying, small tumors in each inguinal region. Circumcision. Three months after, the mother stated that she had not had a particle of trouble with the child from the second day.

As it is not stated that there was phymosis or adhesions in the case—as, therefore, there does not seem to have been any genital irritation—the case would seem to have been one of some central lesion, relieved, for three months at least, by an operation upon the genitals.

CASE 18. Æt. 10 weeks. Not a good night's rest since birth; cried or fretted almost constantly; in constant jactitation. Head thrown back on spine, and kept erect by handkerchief tied around belly. Urine accumulates under prepuce, and dribbles out through a small orifice. Circumcision. Every symptom disappeared, and had not returned three months later.

This would be good proof, were it not for the flaw lying in the fact that the case was only three months under observation.

CASE 19. Æt. 13. Paresis of lower extremities from birth, especially in left leg. Dizziness and pain in lumbar region; nocturnal urinary incontinence. Prepuce firmly adherent, almost to urethral mouth. Adhesions broken up. Disappearance of every symptom, except once incontinence, and no return nine months after.

This constitutes first-class proof, subject, however, to the same reserve as in the last case.

In none of these cases, therefore, is the proof conclusive that urinary incontinence or paresis is caused by genital irritation. A careful perusal of my own cases, as well as of the remarkable one which I have narrated from Dr. Mitchell's article, must convince any one that I am not captious in insisting upon the inadequacy of the length of time during which many of these patients were under observation. If we are to make medicine a true science and practice it as a veritable art, we can only do so by the most rigid application of rules of evidence,—far more rigid, indeed, than is usual in courts of law, for they base conclusions largely upon probabilities, and we can wait for certainties.

I cannot forbear from alluding to Dr. C. L. Dana's thoughtful paper in the issue of the same journal. It contains the histories of two little patients who presented, the one an urinary incontinence and general nervous symptoms, the other a paresis and slight wasting of left leg. In both there were phymosis and adhesions. The first was circumcised. A month after there was no change whatever. Cod-liver oil, iron, hot hip-baths, were ordered. Still no change nine days after; then "ordered complete change in diet, with larger amounts of food, oil, and lacto-phosphate of lime." Rapid recovery ensued in a few weeks, continuing for nearly two years, when he developed Pott's disease. In the second case the genitals were not touched, and the patient was treated with electricity, massage, nux vomica, and counter-irritants to the back. Twenty-four days afterward the little fellow had almost ceased to drag his foot, had much power over the limb, the electrical contractility, which had been slight, was better, appetite had returned, nervousness had greatly diminished. Of the significance of these cases there can be no doubt whatsoever.

SUCCESSFUL REDUCTION, AFTER FOUR MONTHS' MALPOSITION, OF A DISLOCATED THIRD CERVICAL VERTEBRA, CAUSING VARIOUS SERIOUS NERVOUS SYMPTOMS.

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THE patient, a lad of American parentage, 15 years old, was brought to me on the 18th of August, 1880. Four months before he had attempted to turn a somersault, and had fallen upon his head in the vain attempt. There was neither loss of consciousness at the time, nor any untoward symptom other than the appearance of a small projection upon the back of the neck. The next morning he experienced some slight difficulty in swallowing, which steadily increased, although varying in degree from day to day. About thirteen weeks after the accident the bladder became distinctly, though not markedly, paretic. About fourteen weeks after, the patient became sensible of a numbness in the left arm. Three days before coming to me, the left upper and lower extremities became powerless, although, singular to say, this lower extremity had not shown any subjective alteration of sensation except a slight itchiness. During the week previous to his visit to me, a slight numbness had appeared in the right leg. At this first examination I found the left upper extremity almost completely paralyzed in motion, the left lower extremity somewhat less so, both these extremities moderately paralyzed in the sense of touch—I regret to say that I did not test the other sensations—and the left side of the face paretic. The left upper extremity was decidedly fuller than the other, without, however, presenting any œdema or unusual vascularity. There was occasionally a quick, sharp tremor of the whole body, which came on only while he was standing. The tendon-reflex of each quadriceps extensor was greatly exaggerated; but there had not been at any time any symptoms of hasty micturition. Over the region of the third cervical vertebra, there was on the back of the neck a projection about as large as a pigeon's egg. Pressure upon it produced some pain around the point of pressure, but none was felt at the front or side of the neck. The spinous process of the third cervical vertebra was deviated markedly to the right. Inserting the finger into the mouth, horizontally backward on a level with the upper surface of the tongue, a distinct depression could be felt in the posterior pharyngeal wall, corresponding to the third cervical vertebra. The attitude of the head was peculiar. The right ear was strongly inclined to the right, the chin directed to the left, but the point of the chin was not elevated. The right sterno-cleido-mastoid was prominent and tense. The point of the left shoulder was drawn up, the acromion process of the scapula being approximated to the median line of the body, and the inferior angle being thus thrown out.

The patient had been under the charge of several physicians, who had been in doubt as to whether there was not a fracture of the spinous process complicating the dislocation, and who had therefore refused to undertake any attempt at reduction. I was myself in doubt as to the fracture. My friend, Dr. Benj. F. Westbrook, whose anatomical knowledge has been invaluable to me throughout the progress of the case, was firmly of the opinion that no fracture was present. But, fracture or no fracture, it seemed to me clear that a reduction should be attempted. The difficulty of swallowing had become so great that the boy was fed on soft and liquid food, and at certain times even this was troublesome; the nervous symptoms were progressing at an ominous pace; nothing but a restoration of the bone to its proper place offered any hope of saving life; and if the reduction were prevented by the callus of a former fracture of the spinous process, no harm could be done by the attempt. I explained all this to the boy and his parents, and told them in addition that I might possibly kill him on the operating table, but that if he was willing to run the risk I certainly was. He pluckily assented with great promptness. So, on the 27th of August, I went to work.

His condition was then not materially altered from what it had been nine days before when I first saw him, except that deglutition and the left upper extremity had become worse, and a sharp pain had appeared in the left side of the neck and at the back of the head.

In making reduction I was assisted by Dr. Benj. F. Westbrook and Messrs. (now Drs.) Leuf, Callaghan and Ferguson. Counter-extension was made by means of folded sheets laid over each shoulder and then brought across the back and shoulder to the opposite side, where the ends of each were placed in charge of an assistant. A gag was used to separate the jaws. Dr. Westbrook kindly undertook the task of ascertaining, by palpation within the pharynx and along the spine, how the operation progressed. The boy was laid flat upon his back on the table, and etherized until all his muscles were well relaxed. Supporting the head by one hand upon the occiput and the other upon the brow, both my hands being covered by those of an assistant, and counter-extension being firmly maintained, I made extension steadily upward to what I deemed a proper degree, and then slowly and cautiously rotated the head from left to right. It was necessary to make this rotation three several times before the bone went into place, each rotation, however, effecting evident improvement, although no tendinous snap was heard at any time. But go into place it did, and without the manifestation of any dangerous symptom.

An assistant was left in charge of the patient until he recovered from the ether narcosis, and great care was taken to prevent any tossing about of the head. At the same time a billet of wood, enfolded in a towel, was laid under the neck, which was thus made concave posteriorly.

On returning to the house about four hours after the reduction, I was gratified at finding the boy bright and cheerful, having no longer any difficulty in deglutition—he had drunk heartily of milk, which he had hitherto taken only by the spoonful—able to lift his hand readily to the top of the head, much improved in motor control of the left lower extremity, and free from numbness anywhere. The patient was not permitted to rise from the table for upwards of three weeks. During this period the head was kept between the prongs of a photographer's head-rest, which permitted of sufficient lateral motion to render the position endurable, and at night a watch was kept to see that the head was not displaced from this support. At the end of this time he was allowed to assume a sitting posture for a couple of days, and then to go about the room. I now noticed that the spinous process of the third cervical vertebra began to deviate again from the line of its fellows, but only to a very slight degree, and a faint depression could again be felt corresponding to the vertebral body; no nervous symptoms, however, were manifested. I was reluctant to interfere again unless it became absolutely necessary, and I contented myself with enjoining great caution and deliberation in the movements, as well as confinement to the house. Notwithstanding these directions, the patient, after a week of this irksome life, started out one morning and walked about for several hours. The next day I found a distinct, though not very marked, displacement of the vertebra. I immediately determined to run no risk of pressure upon the cord, and accordingly brought the table and the photographer's head-rest into play as before, and kept him thus until I again reduced the bone a few days after, on September 27, in the same manner as at first. Dr. Frank W. Rockwell and Messrs. Callaghan and Leuf kindly assisted me. The reduction was easily made, and the bone went into place with a sharp ligamentous snap. Two weeks more in the supine posture and the patient got up, cautiously at first, and has had no further trouble. He was shortly afterward employed by the District Telegraph Company, and signalized himself as one of their fastest runners. He next passed into the employment of a factory. Some four weeks ago he came to my office and informed me, with considerable complacency, that he had fallen headlong down a flight of stairs without any ill symptoms. No displacement of the bone in any degree can be made out. But, until within a quite recent period, distinct, even in some marked, contracture of certain muscles had remained, and it was ascertained, by a careful examination made some four weeks ago, that these were, on the left side the levator anguli scapulæ and the upper fibres of the trapezius, on the right the splenius capitis, trachelo-mastoid, the complexus, and also the scaleni of both sides. To my surprise, however, he returned to me on 4th of this month (December, 1881) *without a vestige of contracture except in the occipital attachment of the sterno-mastoid.* So that fifteen months after the first reduction the boy is well, and this, be it understood, without any medical treatment whatever of the contractures.

The order and progression of the symptoms in this patient were curious. For thirteen weeks after the dislocation there was none other than a difficulty in deglutition. Then the phenomena came fast and many. First, a vesical paresis; next, a numbness of the left upper extremity; then a numbness of the right leg; then a motor paralysis of both upper and lower extremities; and finally, when he came to me there were found—though the relative dates of appearance could not be ascertained—a paresis of the left face, tactile anæsthesia of the left upper and lower extremities, an occasional tremor, exaggerated tendon-reflex (although there had been no hasty micturition), and contractures of certain muscles of the neck and shoulders. This is the very ideal picture of a group of reflex irritations. To unravel them, and speak of the rationale of each in detail, would require an essay upon spinal anatomy and physiology.

I believe that this case is unique in its reduction after so prolonged a dislocation and supervention of such grave symptoms. I say this with some reserve, however, because I have had neither time nor inclination to search the literature of the subject thoroughly, although I have done so to a large extent. But the success attending it would certainly seem to indicate that on the one hand the dangers of vertebral reduction are greatly exaggerated, and that, on the other, the benefit occurring from such reduction in seemingly grave cases has not been fully appreciated.

THE SURGICAL ENGINE.

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THE surgical engine is a natural outgrowth of what is familiar to most persons as the dental engine.

A dental engine is shown in Fig. 1. It is an instrument not unlike a lathe as to its manner of working. The dependent part seen to the left in the diagram constitutes the expression of its peculiar virtue. This part is made up of a wire cable enclosed in a flexible thread tube. When put in motion, this wire cable is capable of making five thousand revolutions to the minute. The termination of the cable is in a hand-piece, or carrier. Fig. 2 shows the hand-piece; *B* is a support to instruments to be used with it; *C* is a slot for fixation; *E* is a turn-clamp. The piece standing alone marked *A* is a bur; it represents, in its shank, any and every instrument used with the engine.

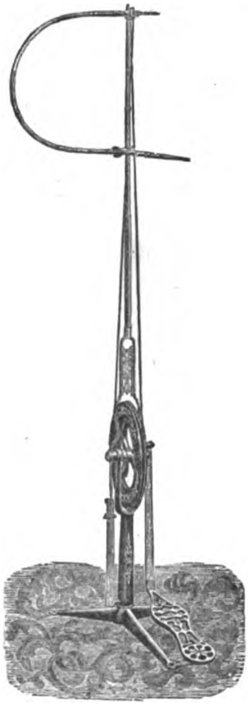
FIG. 1. THE DENTAL ENGINE.

A dental engine, being possessed of but limited power, has its office confined to the treatment of dental lesions and to the lighter operations practiced in oral surgery. In its place, this engine affords an expeditious and a happy means of accomplishing a variety of performances. A surgeon, finding it convenient to own one, will be well compensated for his outlay. The dental engine, surgically considered, will disappoint the practitioner, unaccustomed to its use, if undue demand be made on it; the cable will break, or, what is more common, refuse to revolve the instrument in the grasp of the hand-piece.

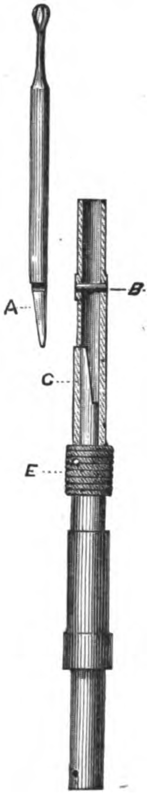

FIG. 2. THE HAND-PIECE OF THE DENTAL ENGINE.

A, a bur; *B*, the support to the instrument; *C*, slot for fixation; *E*, the turn-clamp.

Illustrations in Use.—Being an invention in dentistry proper, the present common use of this particular machine is the preparation of the cavities of carious teeth preliminary to the process known as filling. When dental caries extends to close proximity with the pulp of a tooth, the necessity for the lightest possible touch is paramount; the difference of a hair's breadth is oftentimes all-important to prevent the exposure of that organ. In the majority of instances, such manipulation has to be accomplished unaided by the sense of sight. The engine works with such absolute certainty that the requirements are met without effort or concern on the part of him who directs and controls the lightning-like speed of the point that cuts.

The Removal of Teeth.—It not infrequently occurs that teeth require to be extracted where the relation with a dense alveolar process so nearly approaches the character of a true anchylosis that the force required to break the connection is beyond the ability of the operator to exert or the strength of the jaw of the patient to withstand. Cases of this kind afford signal triumph to this engine; through its aid the writer has succeeded, after a moment of almost painless manipulation, in removing with the greatest possible ease teeth which could not have been extracted after the ordinary manner. To remove a tooth, using the engine, one of the five-sided bits, preferably the smallest, shown in Fig. 3, is placed in the carrier, and, while held closely against the organ to be removed, is revolved until it cuts its way between tooth and socket; this done, the finger forceps not infrequently suffices to lift it from the alveolus. The drill is to possess three or five sharp sides, continued its whole length; thus provided, it cuts from point to base, as the operator carries it around the tooth.

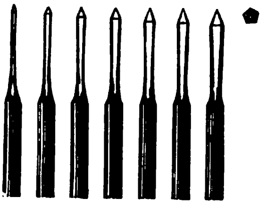
FIG. 3. FIVE-SIDED BITS.

TREATMENT OF AN ABSORBING ALVEOLAR PROCESS.—Loosening of the teeth, arising out of absorption of their alveoli, is a condition met admirably through the aid of the engine. Frequently it is found that the origin of the bone disease, as well as the falling away of the gum from the neck of the tooth, has explanation in the presence of common tartar. The indications in such cases are twofold—1st, to remove all calculus; 2d, to freshen the circular edge of the absorbing bone. To accomplish the first of these indications, sugar-loaf drills, as portrayed in Fig. 4, are to be used—the smaller the better. One of these being placed in the mandrel is carried, while in

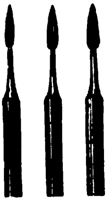
FIG. 4. SUGAR-LOAF DRILLS.

rapid revolution, around the neck and root of the tooth; the scaling effected by it is very complete, while at the same time just enough abrasion is produced in the surrounding soft parts to excite the required reaction, which changes to a healthy surface a suppurating one.

To accomplish the second of the indications—namely, the freshening of the bone—the writer employs the rose drill shown in Fig. 5—smaller, however, than the smallest of these. Resting a drill of this kind against the diseased bone, the circumference is easily removed by means of the slightest pressure made on the revolving instrument. It may not be amiss to allude to the necessity for washing away the detritus by means of a syringe. Through such double operation the writer has found himself able to restore many loose teeth to a fair degree of health. True, the same ends are to be reached by different means; but no other kind of instrument so easily, readily, and painlessly accomplishes the work as those here suggested.

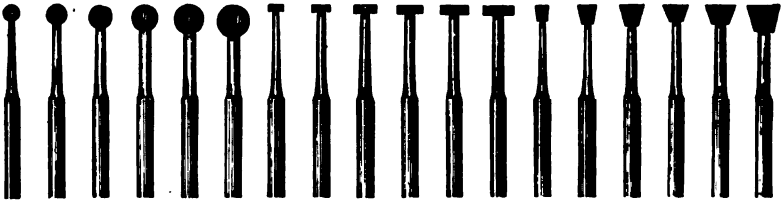

FIG. 5. ROSE DRILLS.

TREATMENT OF CARIES OF BONE.—A glance at Fig. 5 will make plain to the surgeon the usefulness of the instrument in the treatment of osseous caries. As operations on the maxillæ are concerned, the help afforded by it is simply invaluable. By its aid the surgeon feels himself able to do almost anything, and to do what is to be done without effort to himself and with the minimum of discomfort to a patient. On a number of occasions the writer has performed what were really quite extensive operations, while the patient, without an anæsthetic of any kind, was unconscious that the removal of bone was being effected. Extreme as is the assertion in seeming, it is really the case that a whole diseased jaw can be cut from its bed without any particular evidence being afforded to the bystander that an operation of consequence is in progress. A sinus big enough to admit a rose drill is all the external wound required. The pain connected with this means of operating can only be trifling. It is the very nervous alone that think ether necessary. The rose drills used in the operation are to be obtained of all sizes. Those shown in the cut are well adapted to the work.

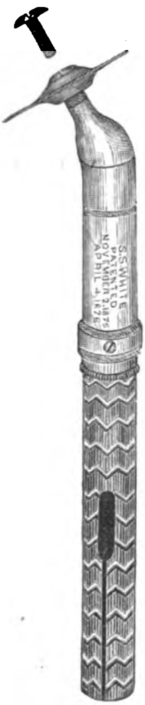

FIG. 6. HAND-PIECE WITH CIRCULAR SAW AT AN OBTUSE ANGLE.

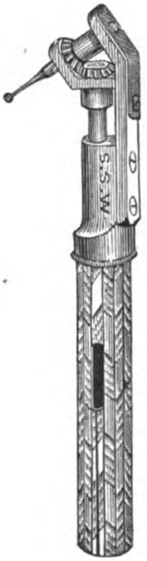

FIG. 7. HAND-PIECE WITH BUR AT AN OBTUSE ANGLE.

Figs. 6 and 7 show modifications on the straight hand-piece used with the engine. In Fig. 6 is shown a small circular saw placed at an obtuse angle. Fig. 7 exhibits a bur placed in a like position. To operate a dental engine, the foot is used precisely as in any pedal lathe. Instrumentation is directed as a pen is carried, through means of its holder.

THE SURGICAL ENGINE.—Fig. 8 represents the surgical engine; the best of these machines known to the writer is that made by Bonwill, of Philadelphia. In the cut, *B* indicates the tripod, or base, supporting the driving wheel with cog-gear and crank. Above this is an upright standard, upon which is placed the flexible arm (*A*), which is a duplication of the human arm, with pulleys at the shoulder and elbow joints for carrying the hand to the hand-piece (*H*). *T* is an arm pivoted near *V*, and at the opposite end, bearing against the spiral spring (*S*), which keeps the arm at any easy, flexible position desired. A screw keeps the arm at any angle. *V* is a sliding tube with a heavy spiral spring inside, with the base of arm (*A*) resting thereon; and, by raising the tube, the band can be always kept so tight as to prevent its slipping on the pulleys. The thumb screw (*U*) secures the tube. At the extreme right of the engine is a sectional view of hand-piece (*H*), as seen on the wrist end of arm (*A*), for imparting rotary motion to the drills (*J*), the saws (*R*), and the bur (*I*). It shows the cone bearings (*C* and *c'*) which insure perfect centering of the tools, with a universal chuck for absolutely holding the same, as well as the general simplicity of the inside work. These are but a few of the instruments used.

The circular saws (*R*) are three-quarter inch, one and one-half inch, and three inches in diameter, and extremely thin. But, with these shown in cut of various sizes, quite every operation can be performed.

A surgical engine differs from the dental in the replacement of the wire cable by a steel arm. This arm is made to represent the upper extremity of man, and is complete in its variety of movements. The immediate revolving power of the mandril lies in the cord seen in the cut. The pedal is replaced by a crank which is worked by an assistant. The number of revolutions attainable is fifteen thousand to the minute. The momentum is next to irresistible. The cost of the machine, independent of the operating instruments, is fifty dollars. The cutting instruments used by the writer have cost him, perhaps, as many more dollars.

A surgical engine can be used for all light operations. Many dentists give the machine the preference for their particular sphere of work. The cable arm in the dental in-

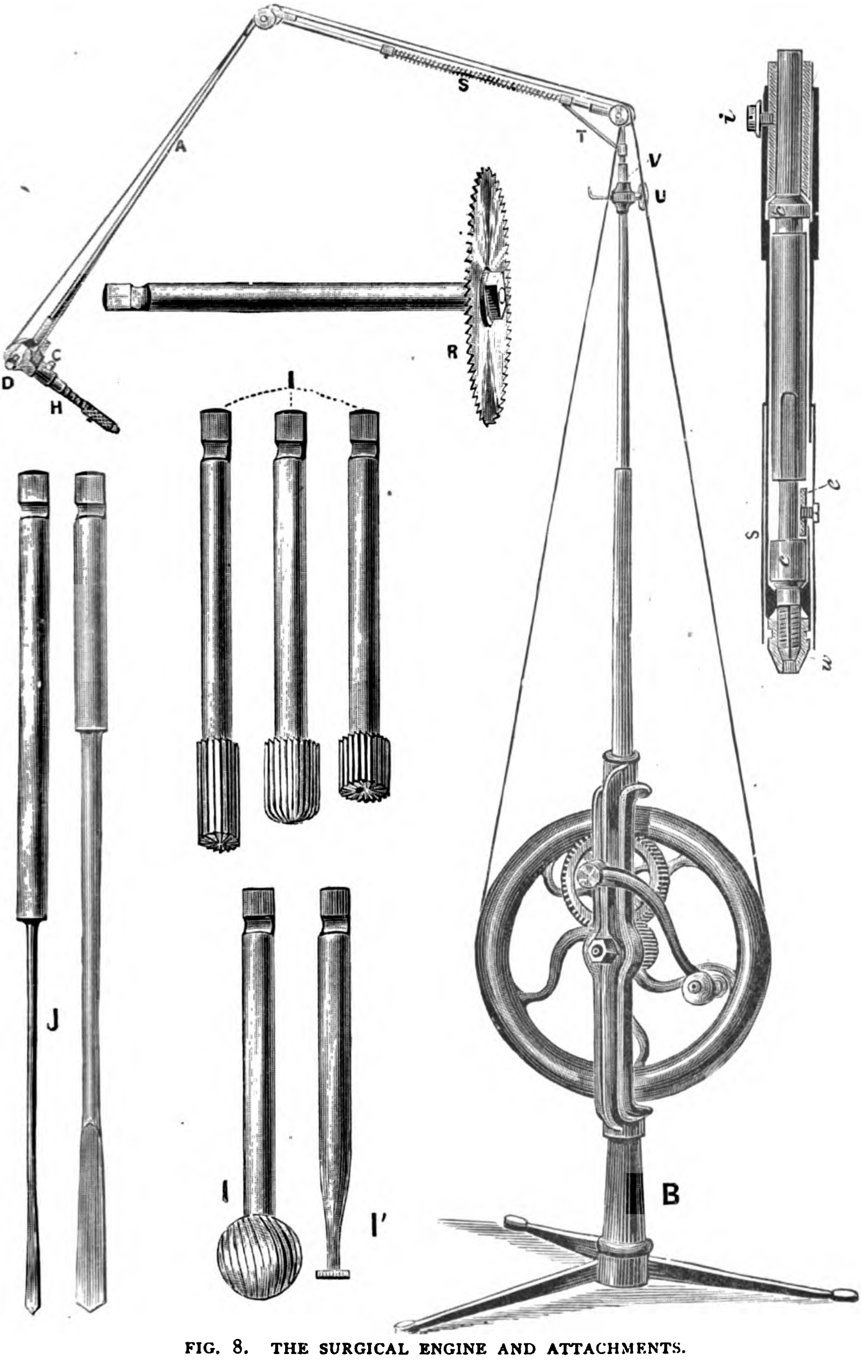

FIG. 8. THE SURGICAL ENGINE AND ATTACHMENTS.

strument commends it, however, to the writer for the simple and most easily-performed manipulations. On the other hand, facility in the use of this last-named engine enables a surgeon to accomplish more important ends with it. The illustrative performances following were first done with a dental engine, this being the only machine in the market at the date of the operations for which the particular cuts were made. It is to be understood that, at the present time, a thought of employing it in similar operations would only be entertained in absence of the power lying in the surgical machine.

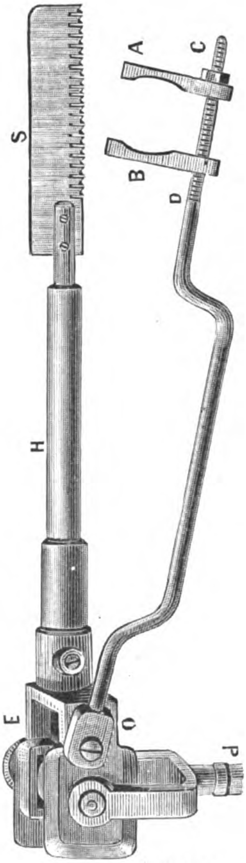

FIG. 9. THE RECIPROCATING SAW.

Instruments used with the surgical engine are drills, burs of different forms and sizes, circular saws of diameters varying from one to six inches, reciprocating (resembling the common metacarpal) saws, the length being from ten to four inches, and special tools.

Fig. 9 is a reciprocating saw (*S*) which moves three-eighths of an inch and cutting both ways for resections and amputations. *H* is the body or handle; *E* is the frame in which the eccentric revolves to carry the saw; *D* is an arm attached to *H* at *O* by a screw, with a threaded end from *C* to *D* for screwing into bones to hold them firmly while being cut. *A* and *B* are feet made adjustable by screw *C*, that any of the round bones can be fastened between the jaws or feet, instead of drilling a hole in the bone, as just described for certain cases of resection. *P* is the end to be placed on the arm (*A*) of engine, by removing hand-piece (*H*).

Special tools are devices to meet special ends: an example of a special tool is a drill of sufficient length to reach the human bladder, encased in a canula for convenience of passing, and for protection of the urethral passage. A second illustration may be instanced in a bur fitted for cutting into dust the carious head of a femur in hip-joint disease. Dr. Bonwill's elevator for fractures of the skull, shown in Fig. 10, is another. It is intended to obviate the necessity of trephining. Can be done only by the assistance of the surgical engine. Should a case arise demanding the thorough removal of the section, it can be effected far more perfectly than by the old round trephining saw by the use of a circular saw or a bur in the engine, and the line of fracture followed and it only removed. The elevator, even here, is of value to extract the piece or to hold it up while the sawing is being done.

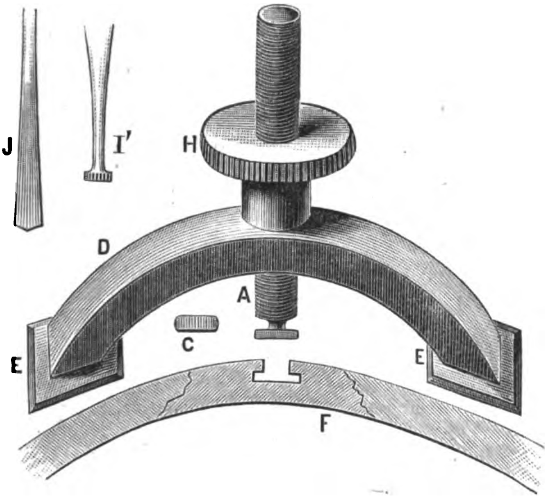

FIG. 10. ELEVATOR FOR FRACTURES OF THE SKULL.

To use it, first take a nearly flat-pointed spear drill (*J*), the diameter of the hook (*C*) on screw (*A*), and place it in the engine, and cut about two-thirds through the plate of fractured bone, which, with the high speed of the engine and a sharp drill, can be done with but slight pressure. Then, with a drill the size of the neck of bur (*I*), drill two holes on one side of the first large hole thus O∞, and afterwards insert bur (*I*) in the larger opening and let it undercut where the smaller holes were made, as shown in section *F*. This will permit the hook (*C*) to pass under and be held in position, while the feet (*E*) of the arch (*D*) rests on either side of the fracture on solid structure. The thumb screw (*H*) is now turned by degrees until the part is in situ, or even higher, that no pressure be permitted on the inflamed parts. Any number of sections can be elevated one after another; or, by making the hole on the lines of fracture, several sections at once.

There need be no apprehension of the drill passing abruptly through the plate of bone, as the surgeon should know well the average thickness of the part. When great accuracy is needed, a gauge or guide can be fastened on to the drill, giving the hole any desired depth. But, where the hand is rested upon the sound arch, the engine at high speed, only slight pressure is used; and the drill withdrawn once or twice, no guide is required.

ILLUSTRATIONS IN USE.—Fig. 11 shows a new operation devised out of relation with the engine for removal of the inferior dental nerve. The deviser begs to commend it as a performance which needs alone but a single trial to place it before all others employed in practice; it is simplicity itself, and, in the estimation of the writer, a perfect operation; it avoids scar, is quickly done, and makes such free and open exhibit of the nerve as admits of absolute verification or refutation of a diagnosis that may have been made. In the diagram is shown a cut which is made along the shade line immediately underlying the jaw. To avoid accident in making this cut, the line, after being marked with a pencil, is pulled upon the bone. The posterior extremity of the incision is to be just anterior to the facial artery, which vessel, if it be found necessary, is dragged from its notch backward, or, if it be desirable to extend the exposure, it may be ligated and pushed out of the way. The cut made is spread, as shown, and a raspatory being used to scrape up a slip of periosteum, the circular saw is applied, two lengthwise cuts being made by it so as to allow of the lifting of the roof of the canal. These two cuts are associated at either end by means of a small trephine or bur. A second manner of doing this operation, with the aid of the engine, one more speedily accomplished, employs a bur half an inch in diameter by three-quarters of an inch in length. Using this with ordinary caution, the roof of the cavity can be scooped off in a few moments. Necessary care being taken of the artery when the nerve is exsected, and the parts being carefully syringed, the lips of the wound are brought together to unite after the manner of first intention.

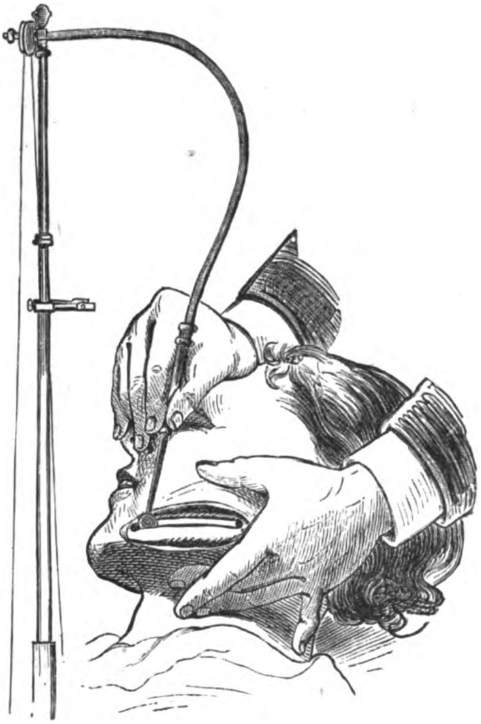

FIG. 11. EXCISION OF INFERIOR DENTAL NERVE.

Fig. 12 stands as the representative of jaw exsections.

The particular case shown exposes the body of the bone by means of a cut separating the lower lips in its median line, this cut being related with two others carried outwardly on either side along the shade line. As is seen, a rim of continuity preserves the contour of the mental region.

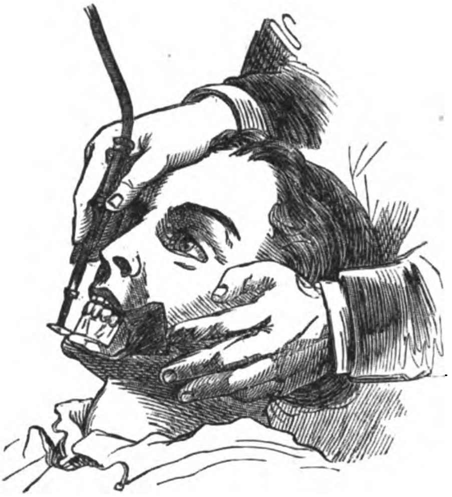

FIG. 12. EXSECTION OF GREATER PART OF LOWER JAW.

As the instances are rare in which the removal of bone is not indicated in treatment of the epulides, the engine, together with its circular saws and rose burs, offers an easy and expeditious means of operating, which, it seems to the writer, must necessarily command, sooner or later, a general employment. In the smaller epulic growths experience has demonstrated the inexcusable impropriety of a section that breaks the line of continuity at the base of the jaw; such section certainly is not necessary in more than one out of every fifty cases. Fig. 13 exhibits a specimen of what is meant by "the smaller growths." Such tumors, while assuredly they demand removal of bone, are to be ablated, as shown in Fig. 14. In the performance of ablation, or exsection, as exhibited in the diagram (Fig. 14), it was a custom with the writer to employ, in common with all other

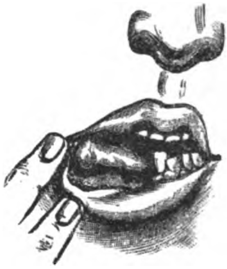

FIG. 13. SMALL EPULIC GROWTH ON LOWER JAW.

surgeons, the straight and cross-cutting forceps. These instruments allow of undeniably rapid accomplishment of operations, but serious objections to their use lie in the facts, 1st, of an inability to cut the jaw bone proper, only the alveolar process being capable of such manner of removal; 2d, in the cut made with the vertically-used forceps there is always more or less danger of fracturing the jaw; and 3d, cuts made with forceps are apt to inflict a damage which it requires much suppurative action to get clear of.

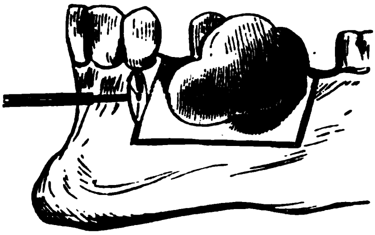

FIG. 14. METHOD OF REMOVAL OF GROWTH BY THE CIRCULAR SAW.

In the employment of the circular saw in this direction, it is only necessary to incise the soft parts in the lines of the cuts to be made. If the size of the morbid growth demand such extent of operation, the saw can be run both vertically and transversely to within a line of the base of the jaw without the slightest danger of fracture, and, because of the delicacy with which the cutting is done, with almost as little danger of a resulting necrosis of the frail but most important septum which has been left, and upon which depends entirely the preservation of the contour of the lower part of the face.

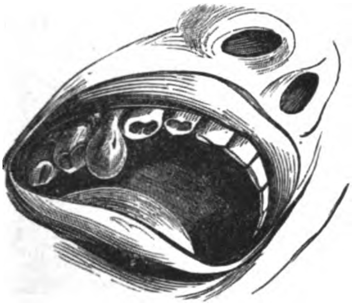

FIG. 15. GROWTH SUITABLE FOR REMOVAL BY THE ROSE BUR.

The use of the rose bur is often resorted to in these cases by the writer. Very small growths (Fig. 15 serves as an illustration) require no other means Cutting off the soft parts of the tumor, a few thousand revolutions of the drill will remove the involved bone with the greatest thoroughness. Indeed, not only the minor, but the major cases also are amenable to this method of radical extirpation.

NECROSED BONE.—The bur of the engine furnishes a rapid means of getting clear of fixed sequestra. Recently the writer removed the full half of a lower jaw, including the condyloid process, where the bone was encased in a shell of new osseous structure. The manipulation was accomplished, without shock or hæmorrhage, as follows: Two adjoining sinuses below the jaw were united by an incision, and a cloaca in the new bone enlarged sufficiently to admit the working of a bur and shank; a cutting means thus admitted amongst the dead structure, it was quickly broken into dust and washed away. No untoward symptoms have presented: the patient is moving about as though no operation had been performed.

EXOSTOSIS.—Exostosis of ivory hardness is to be cut away without effort by the means being considered. A case treated at the Oral Hospital, where the right superior maxilla was involved in mass, required for the accomplishment of the operation one hour and forty minutes. There was not the slightest expression on the part of the power lying in the engine of inability to do the work. The whole jaw was removed, no external cuts being made, and not a single vessel requiring to be ligated.

HIP-JOINT CARIES.—A proper sized bur fixed at the end of a shank of sufficient length spares the necessity of the ordinary manner of exposing this articulation. The instrument, well oiled, is introduced to the seat of disease. When the affected bone has been cut up, and the healthy structure is being intruded upon, a change in sensation is experienced instantly by the fingers of the operator. Great attention is to be given to getting clear of the debris.

REMOVAL OF THE COCCYX.—A device recently practiced by the writer, which has pleased him almost better than any operation he has ever attempted, is the removal of the coccyx without disturbance of the perineal anatomy. This operation was done at Penn Manor on the person of a patient of Dr. William Kirk, a lady who had suffered from the complications of coccygodynia for a period of thirteen years. Exposure of the coccyx revealed it as fractured and standing at right angle with the sacrum. The proposition of the manipulation, as enunciated by the deviser, considers the removal of the bone from the stand-point of simple enucleation; in other words, the removal of the part from its envelope of periosteum without disturbing the under layer, which is the surface of attachment for the soft parts constituting the posterior perineum. It will be seen that the purpose is secured absolutely, and that no disturbance of anatomical function can result. The patient being etherized and placed partially upon her abdomen, an arm being under the body at the region of the diaphragm, to secure freedom in respiration, an incision was made through the skin and superficial fascia the length of the coccyx. These tissues being carried to either side by means of retractors, a second incision was made through the periosteum, and by means of a chisel-shaped knife this structure was raised and everted. In this last is the peculiarity of the operation: it is as though one might cut down the centre of the upper surface of an envelope, exposing, in the turning aside of the paper, a letter lying upon the lower face of the envelope, the turned-aside upper part being of continuity with the bottom of the paper. A succeeding step employs the engine. A circular bur, the face side alone of which is cut, is placed in the grasp of the hand-piece, and, while in revolution to the extent of ten thousand times to the minute, is applied, with delicacy of manipulative touch, to the surface of the bone.

In the case being recorded, five minutes sufficed for the disappearance of the coccyx in the shape of bone dust, the under face of the periosteum remaining as undisturbed as though it had never been in relation with the coccyx. The wound, a superficial one, was put up to heal by first intention.[1]

EXPOSURE OF THE ZYGOMATIC AND SPHENO-MAXILLARY FOSSÆ.—To open into these fossæ with a view of exsecting the branches of the trifacial nerve, the writer makes a trapway of the substance of the masseter muscle and enters the region of the base of the skull through an opening in the ramus of the lower jaw, which opening includes the posterior dental foramen. If the object be exsection of the third division, no difficulty is found in carrying the blades of delicate scissors, guided by the line of the exposed nerve, up as far as the oval foramen. When the intention is exsection of either the second or first branches, the direct exposure implies removal as well of the head of the internal pterygoid muscle. The latter operation is also to be accomplished by passing, with burs, through the external and deep walls of the antrum.

STONE IN THE BLADDER.—A calculus in the female bladder, hard in character, proposed to be broken up, can be drilled and weakened most satisfactorily and expeditiously by means of the revolving drill; perforation of the coats of the viscus is most easily avoided.

TREPHINING.—A revolving bur replaces the trephine. Indications are met perfectly. A floating piece of bone can be burred away without pressure being made on underlying parts.[2]

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[1] *Philadelphia Medical Times*, Vol. xii., No. 371, February 11, 1882, page 303.

[2] A New Method of Trephining the Skull and other Bones. By John B. Roberts, M.D. *Philadelphia Medical Times*, Vol. xii., No. 368, December 31, 1881, page 206.

CONCLUSION.—The hints offered in many of the practical applications of the engine will undoubtedly supplement themselves quickly in uses to which the means will be put by the ingenious and interested surgeon. The ordinary dental engine being found in use by dentists of every locality, Fig. 16 is introduced with a view of suggesting experiment with it by physicians and surgeons disposed to the trial. This instrument, as has been suggested, lacks power to accomplish heavy cuts through bone. This power is to be supplemented by drilling *a series of holes* along the line of the proposed saw-cut, as shown in the diagram. The case exhibited is from life, and the operation was accomplished with reasonable care by the writer, one of the White's engines being used. If a regular surgical engine be not at command, much may be done with the other instrument, through the exercise of a little ingenuity,

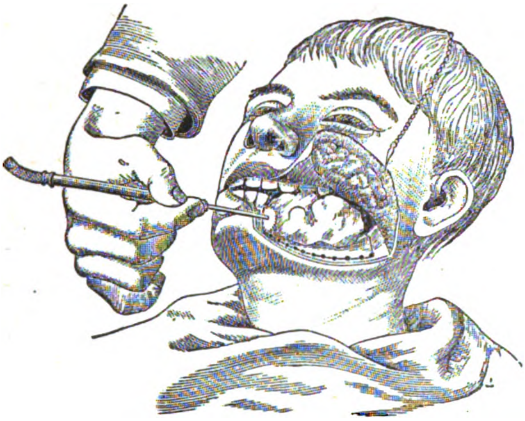

FIG. 16. EXCISION OF A TUMOR OF THE LOWER JAW, SHOWING THE METHOD TO BE FOLLOWED WHEN THE DENTAL ENGINE ALONE IS AVAILABLE.

IRRIGATION AND IMMERSION IN THE TREATMENT OF WOUNDS.

BY DAVID PRINCE, M. D.,

OF JACKSONVILLE, ILL.

SEVERAL years ago the attention of the writer was attracted to the employment of immersion in simple warm water in the treatment of wounds by reports made by Dr. F. H. Hamilton, of New York.[1] The writer had been previously employing perpetual irrigation with warm water containing one per cent. of carbolic acid, the liquid being applied upon compresses every twenty minutes.

The success of this treatment in lacerated wounds was astonishing; irregular lacerated surfaces passing through the stages of healing without change of color of the cutaneous margins. This treatment requires constant vigilance in nursing, in order that the fresh fluid may be supplied with regularity. The floating of lacerated parts in a bath is, however, more comfortable to the patient, and with an automatic arrangement for keeping the temperature at 99° to 101° F.; the attention of the nurse to the patient need not be so vigilant. A very small amount of an antiseptic is necessary, if applied before the commencement of putrefaction. It is sufficient to employ a $\frac{1}{1000}$ solution of carbolic acid and $\frac{8}{10000}$ of salicylic acid, and the writer prefers that they should be combined in the same solution. A case, under observation in the Winter of 1879, of very extensive gun-shot laceration of the forearm, with comminuted fractures of the bones, in which the forearm was kept in a bath, rendered antiseptic, as just mentioned, during four months, was presented to the Tri-State Medical Society (Indiana, Illinois and Kentucky) meeting in Louisville, November, 1880, in a paper entitled "The Management of Wounds," afterward printed in the *St. Louis Medical and Surgical Journal*, and republished as a pamphlet of fifty pages by Lindsay & Blakiston, of Philadelphia.

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[1] *New York Medical Record*, May 15, 1874.

It is supposed that many limbs which ought otherwise to be subjected to amputation can be saved by perpetual irrigation or immersion. The latter is the preferable method, if practicable. It should, however, be mentioned that the pleura is so subject to inflammation by reflex action from cold applications to the thorax, that the greatest caution is requisite, in making wet applications over the ribs, not to subject the surface to alternations of temperature.

The theory of the treatment of any part by irrigation and by immersion is to keep the parts at the temperature most comfortable. This, with the extremities, is found to be a little above the ordinary temperature of the body.

After injuries and operations about the pelvis, the sitz bath may be employed.

It is suggested that, after opening the bladder for the extraction of large calculi, or for other purposes, the employment, for several days, of the sitz bath, rendered antiseptic, may greatly increase the chances of success by diluting and carrying away the urine and all other material liable to decomposition. Such is the sense of relief expressed by patients recovering from perineal section, on being placed in a bath, that it seems proper to enlarge somewhat upon its value in these cases. The open air management is unavoidable, because the flow of urine must saturate any application, rendering it necessary that it should be changed. It is, then, both an open air and at the same time a wet treatment. The Lister method of a spray of carbolic acid to prevent the introduction of organisms during an operation, and of a filtration of air through carbolized dressings afterwards to prevent their entrance, is altogether inapplicable. The antiseptic application must be wet, because a fountain of liquid, flowing from the wound, is ready to saturate any dry application which can be made.

The wound is necessarily one of suppuration where the mingled pus and urine quickly pass into putrefaction in the warmth of animal heat. The application of sponges must be limited to the cutaneous surfaces, while the introduction of the point of a syringe must occasion pain, unless effected with more care and skill than is to be expected. The use of sponges or syringes for the application of water, either simple or medicated, must, therefore, be very imperfect, though better than no application at all.

The position of the pelvis in water meets the necessity for cleanliness without any harsh contact; the water passing to the fundus of the suppurating surfaces, and in those cases in which the urine is dripping away without any control, the opening into the bladder must be free enough to permit the water of the bath to pass into the bladder itself. If the bathing is employed as often as the irritating character of the discharge creates uneasiness, the pus is almost certain to be washed away before it passes into the putrefactive condition.

A child who, while recovering from lithotomy, was nursed by his father, usually became restless at night. His father would then place him in a bath with a speedy subsidence of all irritation. A refreshing sleep invariably followed the bathing. This is an example of the uniform experience of those who have been subjected to bathing to the extent of desire, after perineal section. If the measure were not one believed to add greatly to the safety of the patient, it would still be worth the trouble it requires, in order to secure the comfort which must otherwise be obtained by opiates. The latter blunt the sensibility to a source of irritation, which is itself the occasion of danger, as well as of discomfort. This suppression of irritation often deceives the surgeon, with regard to the presence of dangerous putrefaction, which only needs a shallow pocket as the beginning of a deep burrow, while the bath removes at the same time the source of uneasiness and the cause of mischief.

From the great relief obtained from the frequently repeated and the prolonged bath after lithotomy, the suggestion occurs that perhaps the expedient has been underestimated in other suppurating wounds. In suppurating wounds of the extremities, it is practicable to employ prolonged irrigation; but in wounds of the pelvis this is difficult. It is, however, practicable to alternate the drip with the bath, so that the wound may be kept constantly wet either with simple water or with water medicated with carbolic acid, salicylic acid, or other disinfectants. Observations have proved that union by first intention, as well as union by second intention, goes on under irrigation and immersion quite as well as under a dry dressing, whether the dry dressing be a scab or a blood clot dried in the open air, or an artificial dry dressing. Operations upon the vagina as for vesico-vaginal fistula, and upon the perineum to close lacerations from childbirth, present cases which, according to analogy, should be treated, subsequent to surgical operations, by the employment of the bath to the extent of comfort. Any other method of securing cleanliness involves the danger of destroying the adhesions while they are delicate; and without cleanliness the adhesions are liable to fail through the destructive presence of pus in the condition of putrefaction. It is probable that this method of after treatment has not received the attention it deserves, on account of the trouble its execution occasions where there is not proper preparation for it. If water must be brought and carried away in buckets, the bath is nearly certain not to be employed as often as it ought to be.

In a case of such importance as the cure of stone in the bladder, and one involving the danger attendant upon its ordinary management, it is worth while to make the necessary preparations. In all public institutions it is entirely practicable to have a room in which there shall be a bed with a bath-tub alongside of it, with hot and cold water supply easy of management. If the patient is very helpless, the assistants can lift him into the water, and when sufficiently washed, they can lift him out again. This will be as little trouble to the attendants as giving an opiate, and will, therefore, be willingly executed.

ON A NEW METHOD OF MAKING ANATOMICAL PREPARATIONS, AND PRESERVING THEIR FLEXIBILITY.

By ROSWELL PARK, M. D.,
OF CHICAGO,
DEMONSTRATOR OF ANATOMY IN THE CHICAGO MEDICAL COLLEGE;
CONSULTING SURGEON TO THE MICHAEL REESE HOSPITAL, ETC.

I THINK all who are versed in the matter will agree with me that any dry anatomical preparation, as, for instance, a joint, which shall preserve its identity as a specimen, and at the same time remain permanently flexible, is a great desideratum. Such I have succeeded in making, and take the opportunity offered by an invitation from one of the editors of the ANNALS OF ANATOMY AND SURGERY to publish my method. This method is based upon the peculiar properties of *glycerine*, which are so well known that little or no chance is afforded me for any claim as to originality. For several years I had used it more or less in combination with other preservatives in various embalming fluids and the like. During my experiments I came across, in some old receipt book, a note to the effect that a solution of saltpetre and brown sugar in glycerine would preserve insects and small animals.

Desiring about this time, to make dry preparations of the joints for office reference and for sake of convenience, I determined to try the above combination. Without detailing my various experiments, I will briefly indicate the various procedures. The joints to be prepared—supposing these parts to be selected for preparation—should be carefully dissected, by aid of maceration, so as to remove thoroughly all the soft parts except the ligaments. If one desires to use special time and care, the preparation may be soaked a few days in benzine to dissolve out the fat. It may then be bleached by hypochlorous acid in the following way: A small quantity—4 to 5 grammes—of powdered potassium chlorate is put in a stone jar, and 20 cc. of strong hydrochloric acid poured over it. The jar is then filled with water, and the specimens dropped into it. From six to thirty hours in this solution suffice. After still further scraping and cleaning they are finally placed in the following mixture:

Coffee sugar	2 parts.
Saltpetre	1 part.
Methylic alcohol	1 part.
Glycerine	16 parts.

A *little* water may be used to assist in the solution of the solids; or a good article of syrup may be substituted for the sugar. A little thymol may also be added with advantage, although it is not necessary. It should be dissolved in the methylic alcohol.

In this mixture the specimens are allowed to remain from one to two or even three weeks, according to their size.

After removal from it, they are allowed to drain for a few days, and then need only a little trimming and scraping before being placed in the cabinet. In most cases it will be well to scrape off all the periosteum, except where it would interfere with the ligaments.

Under this treatment the ligamentous structures become as flexible as they were during life, while thick tendons become almost transparent, *and they remain so.* Joints thus prepared with their capsule properly dissected make, for the anatomist's eye, really beautiful preparations. Instead of losing mobility, they become even more limber with time.

I made in this way a full series of preparations of the joints of the body, over a year ago, and they are now better in every respect than when first made, save that they have darkened a little from their original bleached condition. I fully expect them to last as long as I do. There is not the slightest odor of decomposition about them.

Subsequent trials and experiments have convinced me that this method may be successfully applied to all portions of the body, and specimens of any kind. Preparations of an entire limb may be made in this way, which shall be perfectly flexible and serve the purposes of demonstration much better than the dried and varnished specimens found in our museums.

In making them, the vessels should, of course, be injected first, preferably with a mixture of gelatin and glycerine used warm. By this method there will be very little shrinking and shrivelling up of structure. Pathological specimens, of joints especially, can be in this way kept to show to best advantage.

I venture to think that the more this method be tried the better satisfaction it will give. And I would ask that those giving it a fair trial would kindly communicate their results to me.

THE INJECTION OF MONSEL'S SOLUTION IN ANEURISM OF THE SUPERFICIAL PALMAR ARCH, FOLLOWED BY GANGRENE OF THE HAND, AND AMPUTATION.

BY W. W. KEEN, M. D.,

OF PHILADELPHIA,

SURGEON TO ST. MARY'S HOSPITAL; PROFESSOR OF ARTISTIC ANATOMY IN THE PENNSYLVANIA ACADEMY OF THE FINE ARTS.

APRIL 15, 1876, Dr. B., from Delaware, called upon me, with the following statement: Susan T., a child 7 years of age, had been brought to his office the preceding week with a small lump in the palm of her left hand, on the radial border of the hypothenar eminence, about on a line with the web of the thumb. It had followed a fall in which she struck the palm probably on a stone, and had been gradually growing for some weeks. It was now as large as a small cherry; was slightly painful; distinctly pulsatile, the pulsations being arrested on compression of the artery. He diagnosticated an aneurism, and on the 14th had injected, by a hypodermic syringe, he thought, about ten drops of undiluted Monsel's solution. Pulsation was immediately arrested; the thumb and all the fingers at once became blanched, and by the next morning were dark colored and cold.

I found the hand as described, the discoloration having deepened almost to black, and involving the outer three fingers nearly to the knuckles; the last two joints of the forefinger in part, with a suspicious look about the first joint;

and the last joint of the thumb in part, while the proximal was also in a doubtful state.

Her general condition was good; she suffered considerable pain. I advised, as it was clear that gangrene would follow, that the hand be poulticed, and so soon as the line of demarcation was well formed, that amputation be done. I had some hope that at least a part of the forefinger and of the thumb, with a corresponding portion of the palm, might be saved through their connection with the radial artery; and their less pronounced change in color seemed to favor such a hope. No pulsation, however, could be detected in either the princeps pollicis, or the radialis indicis. I saw her with him at intervals. The gangrene of the ulnar border gradually deepened in degree, but did not increase seriously in extent; the thumb and forefinger, however, became more involved, and were clearly, hopelessly lost. Meantime her temperature began to rise, reaching, however, at no time over 102½°, nor did her pulse exceed 120. By the 23d the line of demarcation was well established. On the dorsum it involved one and a half joints of the thumb, the forefinger to the knuckle, the others a little above the knuckles, while on the palm it involved rather less. Accordingly, I amputated above the wrist, with all details of the antiseptic system fully carried out. The next day the child was up and dressed, the temperature had fallen to 100°, and the following day to 99°, and by the 10th day all the sutures were out, and the wound was entirely healed. The arm was dressed but four times.

Dissection showed that unfortunately Dr. B. had fallen on a case in which the superficial palmar arch had no superficial volar artery, but was formed wholly of the ulnar artery which, moreover, supplied the radialis indicis, and at least the ulnar half of the princeps pollicis. This fact readily accounts for the involvement of the thumb and forefinger.

The aneurism had formed on the interosseous branch between the ring and little fingers just below the ulnar, and from it the Monsel's solution readily found its way most extensively and disastrously. In the ulnar artery the clot extended upward a little above the wrist.

I have thought it especially needful to relate this case as another warning against a similar treatment, in view of the numerous accidents which have followed, and especially when other means so readily suggest themselves. Even within a few weeks I observed in the *Philadelphia Medical Times* (September 10, 1881, p. 795), from the *Ohio Medical Journal*, a similar accident, in which two fingers were lost from injecting a nævus with a few drops of nitrate of silver.

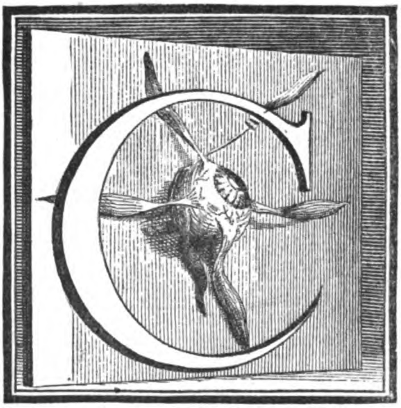
HISTORICAL AND BIBLIOGRAPHICAL NOTES.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M. D.

XVI.—AURELIUS CORNELIUS CELSUS.

B. C. 25—A. D. 40 (?).



CELSUS the Roman—Celsus the elegant Latin medical writer, the Cicero of Medicine—flourished during the latter part of the reign of the emperor Augustus, and during the entire reign of Tiberius. There is some uncertainty both as to the precise time of his birth and also of his death. There is likewise a question as to the place of his nativity. Columella and Quintilian both speak of him as a Roman, while others have claimed that he was a native of Verona. The weight of evidence is in favor of his being a Roman, for we find Celsus himself when giving a Greek name for any disease, and is to add the Roman, often uses this expression, "*our countrymen call it ;*" "*in our language it is,*" etc.

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His first name is generally written Aurelius; it is, however, occasionally given as Aulus, while in most of the ancient manuscripts the initials only are used, thus A. C. C. D. M. L. VIII, which are understood to be, Aurelii Cornelii Celsi De Medica Lib. VIII.

Celsus is by no means an uncommon name in classical biography. More than a dozen different persons of this name are met with in ancient history. While it is not essential to this sketch that each of these individuals should be identified, yet it may prove interesting to many of my readers to have them briefly designated, since some writers have occasioned no small amount of confusion, when speaking of Celsus the physician, by referring facts to him which pertained to several different persons of the same name. I. Albinovanus Celsus was the secretary of Tiberius Claudius Nero, and a friend of Horace, to whom the latter addressed one of his epistles. II. Appuleius Celsus, a physician of Centuripa, in Sicily, who was the tutor of Scribonius Largus; who therefore lived about the beginning of the first century. III. Julius Celsus, a tribune of the city-cohort, was condemned to death under Tiberius. IV. Aur. Corn. Celsus, the subject of this sketch. V. Juventius Celsus, a Roman jurist who flourished in the second half of the first century. VI. P. Juventius Celsus, A. D. 67–130, a Roman jurist, son of the preceding. He was a very distinguished lawyer, a celebrated writer on jurisprudence, and was twice consul. He was both counsel and friend of the Emperor Hadrian. VII. P. Marius Celsus, consul under Nero in the year A. D. 62. On the death of Nero, A. D. 68, he joined Galba, of whom he was one of the ablest and most faithful supporters. He subsequently served Otho with the same fidelity, and afterwards Vitellius took him into the consulship. VIII. Papius Celsus appears as a surname of the Papia gens on some coins of the republican period. IX. L. Publicius

Celsus, consul under Trajan in A. D. 113. He was so highly esteemed by the emperor that he had a statue erected to his honor. Being a personal enemy to Hadrian, this emperor had him put to death, A. D. 117. X. Celsus, an epicurian, a friend of Lucian. He is supposed to have been the author of an attack on Christianity, to which Origen wrote a famous reply. XI. T. Cornelius Celsus, A. D. 265, one of the thirty tyrants enumerated by Trebellius Pollio. XII. Arruntius Celsus, an ancient commentator on Terence (about A. D. 350.) XIII. Celsus, a Greek rhetorician, a pupil of Libanius. XIV. Julius Celsus, a scholar in Constantinople in the seventh century.

Unfortunately our information concerning Celsus, the author of the celebrated eight books on medicine, is so imperfect and meagre, that doubts have been entertained as to his having been in reality a physician and surgeon. By some it has been claimed that he was not a practitioner of these arts; that he had merely studied them as branches of general science, as was frequently done by some of the Greek philosophers. This doubt has received support by the manner in which he is referred to by some ancient writers, as well as from the fact that Pliny failed to enumerate him among the physicians of Rome in his brief historical sketch of medicine, in the twenty-ninth book of his Natural History. The latter circumstance I shall consider of no account, since Pliny for the most part seems to speak very disparagingly of the medical profession, and refers chiefly to those whom he desires to censure. In the fifth chapter of this book, however, Pliny says: " I pass over in silence many physicians of the very highest celebrity," and it is quite reasonable to presume that Celsus was included among this number. Any person who has attentively read the work "De Medicina" of Celsus must have been fully convinced that the writer was not a mere compiler, and that this work is not the product of one who had studied the various subjects embraced in it as a mere part of the culture required for a finished general education. It abounds in matters of the most practical character, and furnishes abundant proof that the writer was not only an actual practitioner and one of ample experience, but also one of careful observation, and possessed of sound judgment. Celsus was evidently familiar with the phenomena of disease, as well as with the effects of remedies upon the human body; and though it is probable that he cultivated other branches of science and literature, and did not devote his time exclusively to the healing art, it is equally probable that he described what he had personally observed and recommended in the way of treatment, what his own experience had sanctioned.

Celsus is said to have written treatises on agriculture, military tactics, architecture, philosophy, rhetoric, and several other branches of literature, all of which have perished by the lapse of time, excepting his famous treatise *on medicine*, in eight books. This is one of the most precious monuments of antiquity. It is an extremely concise, methodic and complete compendium of all that relates to ancient medicine down to the time in which it was written. In surgery it is greatly in advance of the chirurgical writings of Hippocrates, and of all subsequent authors for a period of five hundred years.

These surgical books have always been highly prized. Hieronymus Fabricius ab Acquapendente, in the middle of the sixteenth century, expresses his appreciation of them in the following enthusiastic outburst: "Celsus! admirable in all things, whom I peruse day and night."

The medical and surgical writings of Celsus, as now presented to us by the labor of many learned scholars, are believed to be very pure and complete as well as genuine. In that age in which a great emulation was excited in the effort to procure all the works of celebrated writers, through the cupidity of librarians and dealers in manuscripts, the titles of works were often changed, and often even the text was adulterated and interpolated without detection. Rhodiginus (*Antiq. Lect.*) speaking of such depredations having been committed on the works of Celsus, exclaims indignantly, "they have mangled or sophisticated those sacred records, which crime ought to be deemed a sacrilege, and should be expiated by retributive atonement proportioned to the deed."

All of the editions of Celsus printed in the fifteenth and sixteenth centuries abound with numberless and very gross errors. In 1657, Vander Linden, a very learned Dutch scholar, published an edition in which he made a vast number of corrections. In the dedication he says: "Who would immagine, that after the diligent labors of so many illustrious men, as Egnatius, Cæsarius, Constantine, Stephens, Pautinus, Ronsseus and Rubens, I should have corrections to make in more than two thousand places."

The first translation into English was made by Dr. James Grieve (8°, *London*, 1756) from Vander Linden's or Almeloveen's edition. Grieve complains of the imperfections in the above edition, and speaks of his corrections made from manuscripts and previous versions. In 1831, Dr. Alex. Lee translated Celsus into English, from Targa's edition (1769), which was far more correct than Almeloveen's.

The first edition ever set in type was printed in Florence, in a small folio, in 1478. The second edition was among the earliest books printed at Milan, 1481, also in small folio. These editions are of the utmost rarity. There were but four or five editions printed in the fifteenth century, all of which are very scarce. There were not less than twenty-seven editions in the sixteenth, ten in the seventeenth, and twenty-six in the eighteenth century, and nearly as many have been issued in the present century.

These numerous editions attest the exalted estimation in which this ancient author has always been and is still held by the medical and surgical profession. His fame will continue to live and well deserves immortality.

Alas! I am sorry to admit that Celsus, as well as all of the ancient medical writers, finds but few readers in our own country. The rage for novelty, the utilitarian spirit, the so-called progressive impulse—in itself commendable—which closes the doors upon them, ignores the past, and looks with pitiful contempt upon all ancient medical literature, in my humble opinion, is not quite as commendable, and since there has been no encouragement for the issuance of American editions, none have ever appeared of any of the inestimable medical works of antiquity.

For many years past Celsus has been employed in Great Britain as the test of Latin scholarship and of a respectable and liberal education by which medical candidates are tried. For the adoption of this classical writer there are two excellent reasons—first, that students shall become familiar with the purest and most elegant example of Latinity as written and spoken in the Augustan age; and, as a second consideration, that they should acquire a knowledge of the state of the healing art as it existed in ancient times; and, also, incidentally, cultivate a taste for such antiquarian pursuits. Ronsseus, in his edition of Celsus, speaks thus of his style: "We should prefer his Latin to his medicine, for he has deservedly obtained the highest station in Roman literature by his work, so that the study of medicine may now recommend itself to the man of genius in the sweetest strains of eloquence."

I will proceed to give a brief review of the contents of the Celsian treatises on medicine.

The work of Celsus commences with a brief but carefully considered sketch of the origin, early development, and progress of medicine, including the peculiar tenets of the two rival sects, the Dogmatic and the Empiric, into which the medical profession of his day was divided. The first and second books are devoted to general considerations on diet, therapeutics, and pathology. The third and fourth books are on special diseases and their medical treatment. The fifth book is chiefly occupied with an account of various pharmaceutical agents employed in the treatment of disease. Some of the last chapters of Book V and the whole of Book VI relate to special diseases and their treatment. Books VII and VIII are exclusively surgical.

It would be interesting and instructive to note the numerous matters of importance which are more or less fully treated upon in all the eight books of Celsus. To do this, however, would require a long series of articles, amounting to a fair-sized volume. I shall, therefore, content myself with a mere glance at the books from the first to the sixth; and with a more particular examination of the seventh and eighth books, as they relate directly to the subjects to which this "series of sketches" is devoted, and which necessarily includes Celsus as one of the celebrated Old Masters of Surgery.

[To be Continued.]

EDITORIAL DEPARTMENT.

IODOFORM AS AN ANTISEPTIC.

The days of discussion upon the merits of antiseptic surgery have passed; it is no longer upon trial, if we speak of antiseptic surgery in the sense now generally understood—namely, the observance of every precaution of cleanliness in the treatment of wounds. All surgical procedures must, in order that full justice be done the patient, be conducted in such a manner that agents, both gross and microscopic, operating to produce, invite or perpetuate putrefaction, shall be either prevented from coming in contact with the wound, or, such contact being found impossible of prevention, measures be taken to either destroy the same or neutralize their now generally admitted evil effects. Bold, indeed, must be the surgeon of the present day who, in the face of the revelations and experiences of the past few years, would venture to turn his back upon antiseptics and follow in the old beaten track along which lie so many dangers to his patient. I venture to assert that there is not a surgeon living to-day who does not believe that all surgery, to be successful, must be, conventionally speaking, antiseptic. Year after year, however, as we learn more and more of the requirements necessary to a full accomplishment of antisepsis, the strict essentials are more closely adhered to, and cumbrous details requiring special apparatus are abandoned. The beau ideal, in the way of surgical dressings, for the surgeon of the future will be an antiseptic agent capable of being carried in the vest pocket in a condition fit for immediate use, and to be able to find in any wayside cottage the other materials from which may be at once produced a perfect, safe and efficient antiseptic dressing.

That carbolic acid does not, and probably can never be made to, fulfil all the requirements of antiseptic surgery is now pretty generally admitted. The disadvantages and sometimes actual dangers attending its use have of late received recognition ; surgeons are, therefore, casting about in all directions, endeavoring to find some cheap and reliable, yet harmless, substitute. The necessity for this is to be regretted, when one recalls the extent to which surgery is indebted to the introduction of carbolic acid into practice in the treatment of wounds. The good it has done can never be overestimated nor exaggerated, even by the most enthusiastic of the disciples and followers of Joseph Lister, who made it possible for carbolic acid to be of such service to mankind. In so far as its antiseptic properties are concerned, carbolic acid has not failed ; substitutes however, possessing in a marked degree similar antiseptic properties, and which at the same time have none of its objectionable features, have been brought forward.

Early in 1881, Prof. Mosetig-Moorhof, of Vienna, brought to the notice of the profession the advantages attending the use of iodoform as an antiseptic. Probably no modification of Lister's dressing has been introduced of greater importance than this. That iodoform is a remedy possessing decided antiseptic properties is certain; and the simplicity of its application is such as to render its use widespread and and popular. Should further experience in its use bear out the enthusiastic estimate of its value, as advanced by its originator, in wound treatment, it will prove to be, par excellence, the antiseptic of the future. Mosetig-Moorhof's first application of this agent was to wounds following excision of joints of a strumous or tuberculous character. The success attending its use in these cases led him to employ it in general practice as an antiseptic; and his confidence in it seems to have become strengthened by increased experience in its use.

As might naturally be expected, an agent so potent for good as iodoform has been accused of having undesirable, nay, even poisonous, properties. König of Göttingen gives it as his opinion that the use of the agent is not devoid of danger. He attributes a death following hip-joint excision, in his practice, to iodoform. The patient was a child, and König takes occasion, in reciting the case, to utter a word of caution in the use of iodoform in infants, believing them to be peculiarly susceptible to its influence, when used in large quantities. [1]A fatal case occurring in the practice of Mosetig-

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[1] *Centralblatt für Chirurgie*, No. 48, 1881.

Moorhof has excited much discussion in Germany, and is of sufficient interest to merit a short resumé. The case is as follows: The patient, aged 17, badly nourished, and of strumous habit, came under observation with an enormous abscess of the lower third of the thigh posteriorly, of three months' standing. An incision into this was followed by phlegmonous erysipelas, extending down the back of the leg. For this condition a long incision was made, releasing sloughing cellular tissue, and relieving tension. The gaping edges of this incision, and the adjacent cavities left by the sloughed cellular tissue, comprised a surface containing about three hundred square centimetres. Over this large surface iodoform was plentifully sprinkled, the edges of the wound brought together and dressings of cotton containing iodoform applied, with an outer covering of gutta-percha paper. At the end of a week, the dressings were removed and reapplied, a new supply of iodoform being sprinkled upon the cotton. Following this occurred serious cerebral symptoms, accompanied by vomiting, dilated pupils, and, finally, unconsciousness, the patient dying with symptoms of cerebral compression about three weeks after the first iodoform dressing. There was no rise of temperature throughout the case. It is further noted that no paralysis or convulsions occurred. The post-mortem revealed a tense condition of the dura mater, an unusually large number of Pacchionian bodies, the arachnoid thickened and opaque, the pia mater very thin, œdematous and anæmic, the cortex cerebri pale, soft, and in removing the pia mater portions of the cortex were found adherent. The remaining brain substance was anæmic and moistened by serous fluid. The ventricles were contracted, and contained a few drops of clear serum. The stomach was very much enlarged. With the exception of a slight œdema of the lungs, nothing further abnormal was found.

Here was a case in which it was broadly hinted that the fatal issue was directly due to the free use of the iodoform upon an enormously large wounded surface. In commenting upon this case, König declared it as his belief that it was an indubitable case of iodoform poisoning. Mosetig-Moorhof, on the other hand, refused to believe that the antiseptic employed in this case had anything to do with the fatal termination. It is reasonable to assume that the case against iodoform is not fairly proven by the unfortunate termination in this instance. Nor can charges of like character be sustained, until experimentation upon the lower animals shall have determined the mode of death in fatal iodoform poisoning. This task has been attempted by A. Höyges. According to this investigator, there were found, as constant symptoms following the administration of toxic doses of iodoform, deep sleep and loss of reflex activity. Death occurred from asphyxia, due to paralysis of the respiratory centres ; and post-mortem examination revealed, as a rule, extensive fatty degeneration of the heart, lungs and liver. The exact extent to which these ill effects are to be feared, when the drug is judiciously used, is yet to be determined. At the present time, German surgeons are inclined to use it boldly and fearlessly. Subsequent observations may develop the fact that smaller quantities than those now employed will suffice.

Wölfler, Billroth's assistant, calls especial attention to the advantages attending the employment of iodoform as an antiseptic dressing following operations within the cavity of the mouth and about other orifices of the body, as well as in other situations where ordinary antiseptic dressings are generally inadmissible. The most brilliant successes are reported where the agent has been employed under these circumstances. A series of eighteen operations for cancer of the tongue in Billroth's clinic are quoted by Wölfler, as exemplifying its usefulness in this class of cases. In the above mentioned series, not a single bad symptom or complication supervened, rapid recovery ensuing. Iodoform gauze, tightly packed upon the stump, was used, the wounds remaining perfectly aseptic throughout the healing process. Similiar successes are claimed for Mikulicz and Prof. Von Frisch, of Vienna.[1] Excellent results have followed the use of iodoform combined with the ordinary Lister dressings, in the hands of Esmarch.

Mosetig-Moorhof, the originator of the iodoform treatment of wounds, bases his theory of its applicability as an antiseptic dressing upon the following :[2]

1. Iodoform is a specific for local tubercular processes. Its most important effects are of a local character, but a remotely beneficial effect is also developed.

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[1] *Weiner Medizinische Wochenschrift*, 1881, No. 42.

[2] Wölfler, *Centralblatt für Chirurgie*, 1881, No. 48.

2. Its effects are more certain when fungous granulations are previously removed. This is absolutely necessary, however, only in caries fungosa.

3. Iodoform, sprinkled upon a wound surface, is a reliable antiseptic.

4. Iodoform, when absorbed, is excreted by the kidneys ; in moderate quantities it is not only harmless, but may affect favorably some diseased processes.

5. Iodoform has a local sedative action. It hastens granulation and prevents septic diseases of the wound.

6. The course of the cases in which iodoform has been used is usually characterized by an absence of fever. The powder deposited between the surfaces of a wound does not prevent union by first intention.

7. The same precautions being taken in the matter of drainage, etc., as in using other antiseptics, changes of dressing are necessary only when a rise in temperature or some special symptom demands it.

8. Erysipelas and other accessory surgical diseases resulting from resorption of septic wound secretions are very rare.

9. With the exception of the general precautions of cleanliness and washing with clean water, no other disinfecting agent is necessary when iodoform is used.

10. Iodoform will be found to be the cheapest and most certain antiseptic for general applicability ; the preparation preserves for years.

11. Iodoform is especially useful in operations about the mouth, rectum and bladder, in addition to its general usefulness.

12. For sensitive persons iodoform can be deodorized by the use of the Tonka bean.

GEORGE R. FOWLER.

PRUDDEN ON HISTOLOGY.[1]

In the rapid multiplication of text books, a writer should give good reason before adding to the list. Contrary to our feeling at the outset, we believe a careful perusal of this little book will show that the author has demonstrated both the need for, and his ability to meet the demand. The border lines between the known and the unknown are usually very clearly stated, and the entire book represents, faithfully, our present state of histological knowledge. The plan is simple. There is given a brief description of the tissues under observation, and in clear, concise, excellent English, are stated the better methods of study and demonstration. To the histologist who began his studies a dozen or fifteen years ago, the contrast with the methods of even the best German teaching is most satisfactory. In few directions is the progress in the art of teaching better shown.

The book is not intended to furnish a short road to the knowledge of Histology, but to give to the student a practical guide in his labors. Instead of supplanting the larger and most admirable works upon Histology, with which the profession is now furnished, it is to serve as a hand book, and is full of practical hints and suggestions. For the laboratory worker, it is a ready reference, and is useful, in the same way as, in the study of practical anatomy, the dissector supplements the larger works upon anatomy. The chapters upon cartilage and development of bone appear to be of exceptional excellence. We regret to notice that almost nothing is taught of the treatment of tissues in their fresh state, but that processes of preservation and artificial hardening are nearly universally emphasized. We have felt that one of the most important of the recent advances in the preparation of tissues for microscopic study, and this for many and obvious reasons, is in the making of extremely large, uniformly thin sections of fresh specimens of frozen tissue. It is true, every student will not be able to furnish himself with modern devices for freezing tissues, but, at least, no laboratory should be without them. Of the various instruments, the simple and effective one of Prof. Hailes, of Albany, leaves little to be desired. The most of our work has been done with one this last year, and we have come to look upon it as not only giving much better results, but really as a time-saving aid. HENRY O. MARCY.

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[1] A Manual of Practical Normal Histology, by T. Mitchell Prudden, M. D., New York, G. P. Putnam's Sons, 1881. Pages, 250.

A CRITICAL, HISTORICAL AND CLINICAL STUDY OF SMITH'S ANTERIOR SPLINT.[1]

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OF BALTIMORE, MD.,

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NO injury is more common than fracture, no service is more frequently demanded of the surgeon than that of setting a broken bone, no subject in the whole range of surgery has been more ably and vigorously discussed, and yet, perhaps, there is no subject upon which there exists at this present time more radical difference of opinion. It is quite true that surgical progress in the matter of the treatment of fracture has been very decided. The tendency has been toward simplicity of apparatus, and the comfort of the patient has of late years received more consideration than it did at the hands of our fathers. The principles of treatment and the anatomical difficulties which stand in the way of their application are so thoroughly understood that the discussion is practically limited to the method. Everyone admits that the proper way to treat a fracture is to place the bones in apposition and keep them there until union has occurred; but so great are the difficulties which lie in the way of carrying out this dogma, that the ingenuity of surgeons has so far been unequal to the task of devising a method so perfect as to receive general support. The best talent of this, as well as of preceding ages, has been devoted to the subject—especially with regard to fractures of the lower extremity—and numerous claims to perfect results in all cases of fracture of the femur have been made and are still made; but the constant recurrence of the experience that the boasted apparatus will not achieve the same brilliant results in the hands of surgeons other than the inventors, and that even the measuring tape in unprejudiced or inimical hands will not verify the claim to a perfect result, is a circumstance which he, who wishes to study fracture apparatus, would do well to consider. One instinctively shudders in looking over the various machines which went under the name of fracture apparatus among the older surgeons. John Bell denominates them instruments of torture more terrible than those used by the Inquisition for that purpose, and casts them all aside for the simple method of Pott. In speaking of some of the elaborately cruel methods of his day, and more especially of those of the French School headed by Dessault, he says: "*Extension* was the fixing of lacs and bandages upon the lower part of the fractured limb, to which were applied ropes and pulleys by which the assistants pulled; *counter-extension* was the resistance which other assistants made with table-cloths, quilts and bandages put around the pelvis and upper part of the thigh; *coaptation* was the thumbing and working the smaller fragments and the broken end of the bone into nice contact with each other; but *delegation* was a process which it would take hours to describe as it took hours to perform; of compresses applied round the broken ends of the bone, pads and cushions to be laid along the sides of the limb, splints above the compresses and cushions, with distinct rollers for each separate stage of the operation. Such practices are, or soon will be, totally disused by all sensible men, nor will the terms be allowed to remain as memorials of those absurd cruelities, or as stumbling blocks to young students who read about these—aye, and about more desperate operations which never will be performed again." Bell's prophecy is fulfilled, at least, as far as America is concerned, and whether we use straight-extension, plaster, or one of the various forms of inclined plane, our setting of a broken femur is no such ordeal for the patient as that process referred to by him. And, although we still retain the terms extension, counter-extension and coaptation, they have no such terrible significance as they possessed a hundred years ago.

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[1] Read before the Clinical Society of Maryland December 2, 1882.

In regard to fracture of the femur, probably the most important of all the fractures, modern American surgeons will be found to advocate one of three great plans of treatment, viz.: straight extension variously modified, plaster of Paris or other immovable apparatus, and the double inclined plane in one or other of its various forms. It is true that the fracture box is still retained by some, but the part it plays in the treatment of fracture of the femur by surgeons of the present day, scarcely entitles it to consideration in a discussion of the subject. And even if it were introduced it would be relegated to the same class as the starch and plaster methods, since the principle on which it acts is the same. The great principle involved is that of extension, and the question which arises is whether such extension as is necessary for bringing the fractured ends together should be made at once when the apparatus is applied, or whether the apparatus should be such as will exercise constant traction on the lower fragment. Among the advocates of this latter proposition are many of the ablest surgeons of the day, whose names are too well known to require any mention from me; and, perhaps, the most generally accepted practical exposition of the doctrine of continuous extension is seen in the method of Gurdon Buck. The advocates of the other proposition, that reduction should be effected at once, and the apparatus so arranged as to retain the parts in apposition, are much divided as to the best method for putting their doctrine in operation, and so advocate one or other of the various forms of immovable apparatus or inclined plane. It would be interesting to follow up the subject philosophically, to develop it in its various directions, and to point out the various attempts which have been made to combine the principles of treatment and achieve the best results, but the scope of this paper is too narrow and my time too limited for such an undertaking.

What I propose to consider is one of the forms of inclined plane, which has the additional feature of suspension. It is but natural that I should be accused of local prejudice by those who are not acquainted with Smith's Anterior Splint, but I hope to show, before I conclude, that I have considered the subject impartially, and that the conclusions arrived at will be justified by facts and principles. I propose to show that what we know as Smith's Anterior Splint is not the work of any one man, but the result of the development of an idea which originated a hundred years ago, and has been elaborated from time to time, until made complete by the genius of Smith: to demonstrate that the splint, as applied by the inventor, can not produce extension in its modern surgical sense, as claimed by him, and to show that the instrument is the best exposition of the principle of treatment, which I shall call *retentive*; that it performs this function in a manner equally efficient and infinitely more comfortable to the patient than any other apparatus, and that for general purposes it is the best instrument for the treatment of fracture of the femur, whether simple or compound.

The obvious advantages of suspending a broken leg do not seem to have become apparent until the latter part of the last century, and even then no one seems to have thought of applying it to the treatment of fracture of the femur, and the earliest example of its practical application, that I have been able to discover, is found in "Benjamin Bell's Surgery," published in Edinburgh in the latter part of the eighteenth century. Bell figures a sort of hammock made of independent strips of cloth laid across two parallel bars, the whole supported upon a framework made to rest on the bed. This appliance was invented by James Rae, and improved by his son John Rae, both surgeons of Edinburgh, and was successfully used by them in the treatment of fracture of the leg. I present a cut of Rae's apparatus, which will save words and give a better idea of it than any description I could give. The cut is a tracing from the original representation in Bell's work. Bell, himself, modified the apparatus of Rae, substituting in place of the hammock of straps, a wooden trough with an opening for the heel, and making several other changes which it will not be necessary to discuss here. In fact I only introduce the apparatus of Rae as a historical relic, since, although its invention marks an epoch in the history of the treatment of fracture, it is important rather on account of the principle involved than because of its utility.

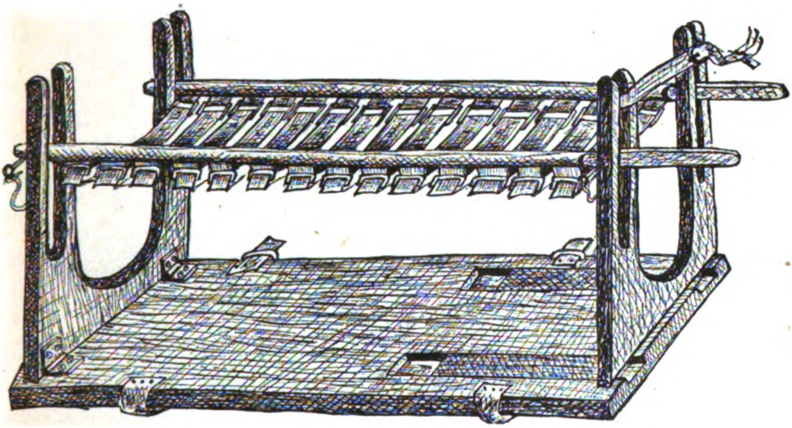

FIG. I. RAE'S APPARATUS.

The apparatus of Ravaton, in use in France about the end of the last century, and described by M. M. Boyer, Merchie and others, brings us a good deal nearer the present time and the present perfection of suspensory splints than could have been dreamed of by those who only knew of Rae's invention. Ravaton really deserves the credit of first using suspension, properly so called, for although Rae, by his instrument, attained the desired elevation and flexion, it was supported from below and allowed none of the lateral motion which is one of the chief points in favor of suspension. The plan of Ravaton was carried out by placing the leg in a zinc trough or *bottine* with a footpiece, and supporting it by straps on the sides of a wooden frame which, in turn, was suspended upon supports above. This apparatus is evidently a modification of, and a great improvement on, Bell's modification of Rae, which had been introduced into France by Dupuytren.

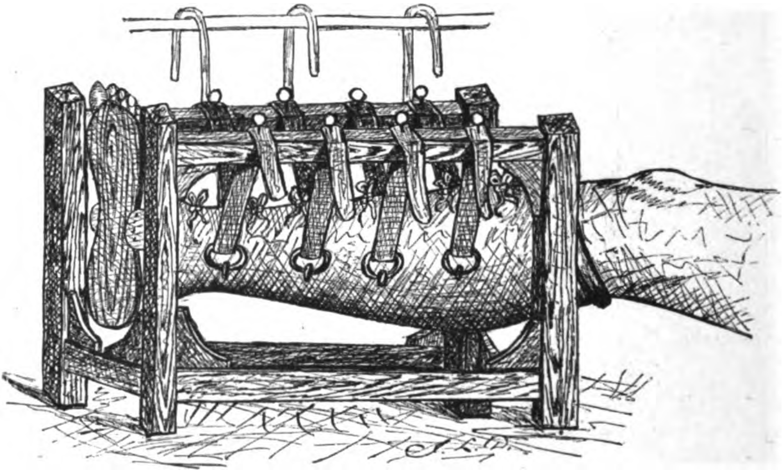

FIG. 2. RAVATON'S SUSPENSORY SPLINT.

In 1812, Mr. Sauter, a surgeon of Constance, having studied the method of Ravaton, and modified it considerably, published a pamphlet, entitled: "*Instruction for Treating Surely, Conveniently and Without Splints, Fractures of the Extremities, Especially Complicated Ones and Those of the Neck of the Femur, according to a New, Easy, Simple and Cheap Method.*" Sauter pushed the application of suspension with the aid of a double inclined plane to the treatment of fractures of the femur. He used few regular bandages, and relied on what we would call handkerchief bandaging chiefly for retaining the proper relationship between limb and splint. He claimed great advantages for his apparatus, and among them most prominent were lateral mobility and facility in dressing the wound in cases of compound fracture. Although Sauter used much industry and ability in elaborating and disseminating his views, the surgeons do not seem generally to have adopted them, and while his apparatus is often figured and his ingenuity commended, his method seems to have been practiced chiefly by himself.

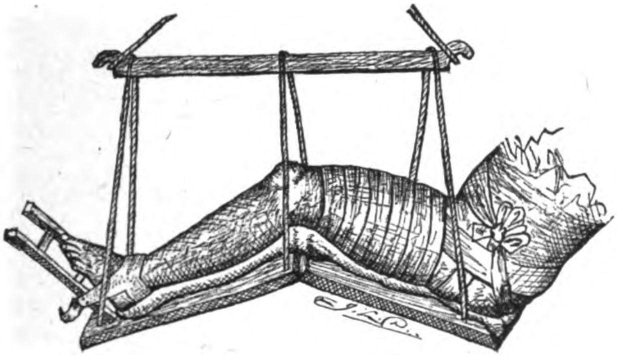

FIG. 3. SAUTER'S POSTERIOR SUSPENSORY SPLINT.

In 1838 another distinguished Swiss surgeon, M. Mayor, of Lausanne, published in his "*Nouveau Systéme de Deligation Chirurgicale,*" the various modifications which he had made in Sauter's method, together with a strong plea for its adoption by surgeons. In speaking of what he calls his "*methode hyponarthecique,*" he remarks with commendable modesty: "The illustrious and ingenious Sauter, as every one knows, had the first idea of the apparatus of which I have given a description. But I have added so many modifications to every part of Sauter's apparatus, and have given such development to this particular mode of treating fractures that I can claim a very large part of the good which the new method has produced. "Mayor's modification consisted in substituting a wire frame work for the *planchette* of Sauter, suspending by converging cords and changes in minor details which it will not profit us to follow. That he made considerable impression on the surgical opinion of the day is apparent from the consideration his apparatus receives from his contemporaries. So great an authority as

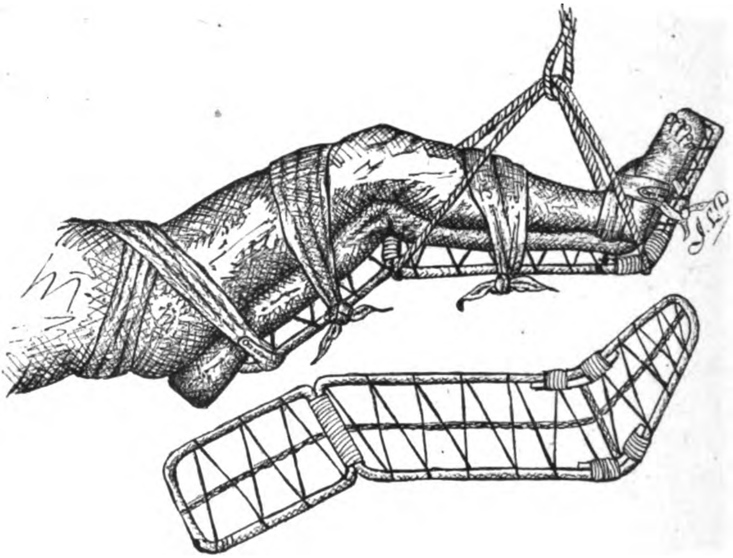

FIG. 4. MAYOR'S POSTERIOR SUSPENSORY SPLINT.

Vidal de Cassis remarks in regard to it, that "when fractures are treated according to this plan, the member remains uncovered; if we have to do with a compound fracture it is not necessary to change the splint to attend to the dressings. Fractures treated in this way are not followed by so much œdema, as those placed in the ordinary apparatus in which the member is for a long time subjected to a decided compression. If the apparatus is suspended, the patient can execute a variety of movements and change his place in bed." M. Merchie, while he does not heartily approve of the plan, says: "One can not deny that the apparatus for suspension is founded on an extremely ingenious idea, and shows a marked superiority over other splints, especially in cases of compound fracture of the lower extremity." Mayor's posterior suspensory splint may be looked upon as the immediate predecessor of the subject of this paper, and a comparison of the two will show a great many points of resemblance.

But the necessity of placing cushions between the limb and the splint, and the impossibility of so arranging them that the pressure would be evenly distributed, presented objections which the genius of Smith was to surmount. We shall, however, commit a grave error if we conclude that Smith took up the matter where Mayor left it off, and that his splint is simply a modification of the latter's. He had also been working in the same direction, and, in 1832, in the *Baltimore Medical Journal and Review*, published a description of a posterior suspension splint for which he claimed great merit. It consisted of a double inclined plane resembling in many points that of Mr. Amesbury, with the exception that it was suspended. But there was with it the same difficulty of equably distributing the pressure on the posterior surface of the limb. The thigh was enclosed in a leather trough, while the leg was supported upon muslin strips connected to the side bars of the splint. In his work on the "Anterior Suspensory Apparatus" he does not give an account of the development in his mind of the great idea of placing the whole splint on the anterior face of the limb; but it is fair to presume that it developed from the facility with which the pressure was distributed in the leg portion of his posterior splint. That the idea was original with him, I believe has not been questioned, and if it had been, the matter could be easily set at rest by the positive statement of Dr. E. Fischer in v. Pitha and Billroth's "General and Special Surgery," that "suspension by means of an anterior splint first came into general use through Smith, of Baltimore.". This, then, is the only element in the apparatus for which the inventor can claim

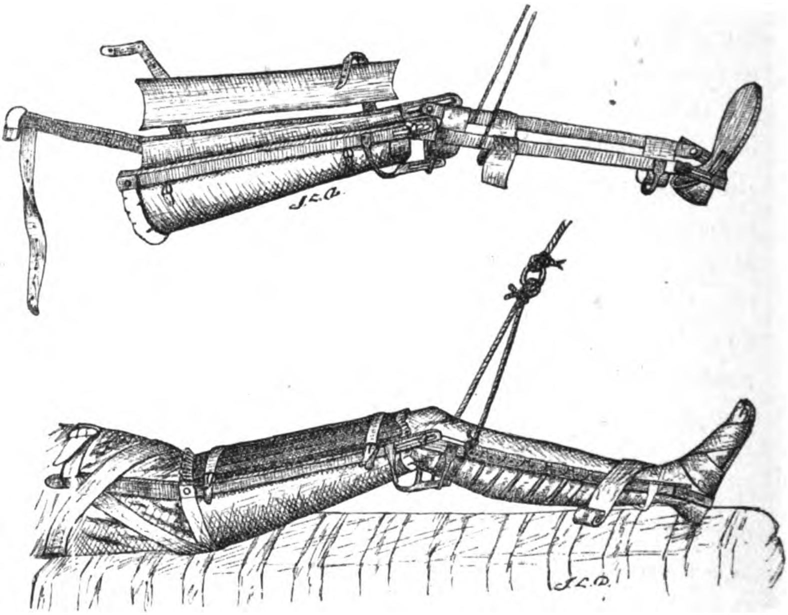

FIG. 5. SMITH'S POSTERIOR SUSPENSORY SPLINT.

priority, and this, indeed, is the feature which was the great desideratum in suspensory apparatus. Everything else which the anterior splint is capable of could have been achieved by that of Mayor or even Sauter. Merchie, in his criticism of these posterior splints, says: "Circular compression, which, in our opinion, is as necessary in the treatment of solutions of continuity of bone as perfect retention, does not exist; and its absence in the case may produce inconveniences which are not compensated for by any of those qualities so highly praised." The criticism, perfectly just as it is, as applied to any splint which causes the limb to rest on a flat surface, loses its power in the presence of the anterior application of the splint and the perfect adaptation of bandage to conformation of limb which this makes possible, and it is this feature which has immortalized the name of Smith, and enabled his splint to hold its own among Baltimore surgeons for the last twenty years.

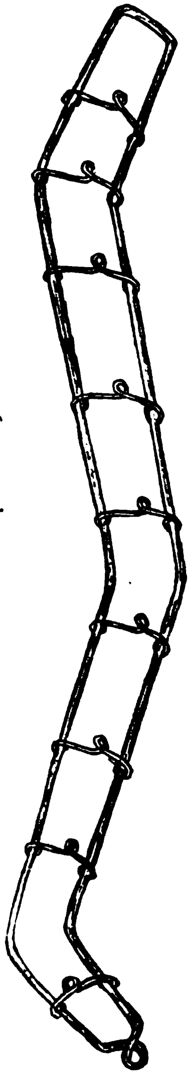

FIG. 6. SMITH'S ANTERIOR SPLINT.

The anterior splint can be described in few words as it can be applied in a few minutes. It consists of a parallelogram of wire about the size of a No. 10 bougie, about three inches wide, and six or eight inches longer than the limb to be treated; cross wires connect the two parallel wires at intervals of about six inches, and these are twisted so as to make a ring in the middle to which the hooks used in suspending are attached. Two hooks are used, one at either end of a stout cord about eighteen inches in length. This cord plays through a ring or hook in a longer cord which passes through a pulley secured in the ceiling and is made fast by a tent block, thus allowing the elevation of the limb to be changed at will. The splint can be bent over the back of a chair or other convenient support, at the hip, knee, and ankle, to suit the exigencies of the case in hand, the uninjured limb serving as the guide for the flexures. The fracture is reduced and retained by assistants while the surgeon secures the limb to the splint by short pieces of bandage. The apparatus is then suspended, arrangements to that end having been previously made, and after the surgeon has assured himself that all is right, the roller is applied. In cases of compound fracture the seat of the wound may be left free and afterwards supplied with an independent bandage, which can be changed

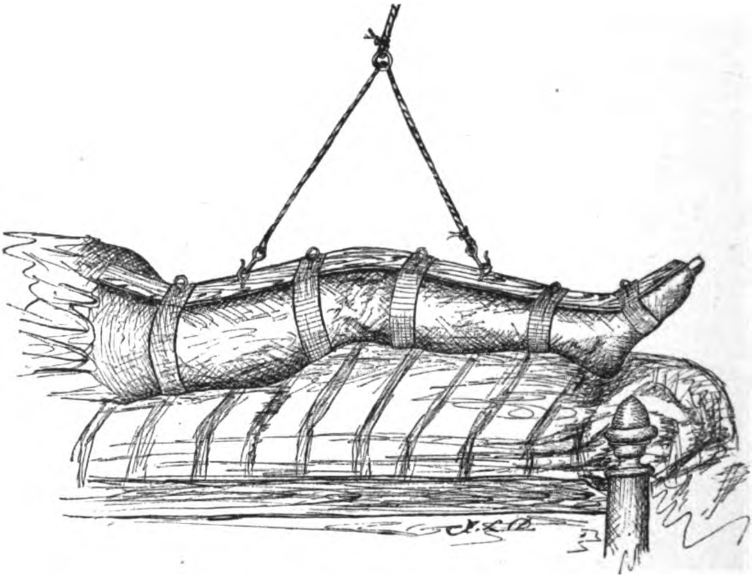

FIG. 7. TEMPORARY BANDAGES.

according to the requirements of the dressing. If the surgeon expects trouble and wishes to be especially watchful of the case, the bandage may be strongly stitched to the splint and the whole middle part cut out with scissors, thus opening the whole anterior face of the member to daily inspection. A few turns of bandage secures the apparatus to the pelvis. Coaptation splints may be used at the seat of fracture, but these are generally a useless encumbrance rather than an aid, since the splint and bandage, properly applied, do all that is necessary for the proper treatment of the case. The member rests evenly on its *whole* posterior surface, the roller makes comfortable and efficient lateral compression, and the whole swings easily from the suspending cord. The range of movement allowed the patient without disturbing the relation of the fragments

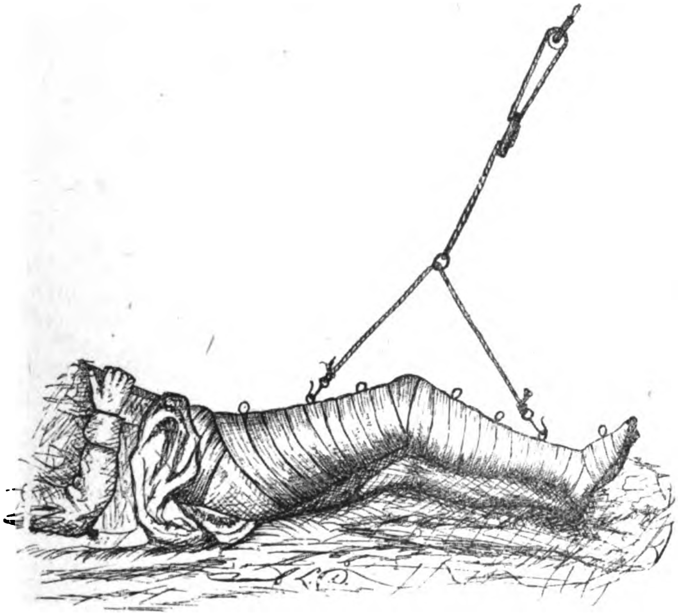

FIG. 8. SPLINT APPLIED.

or causing pain is very considerable, and as the case progresses he may even leave his bed and sit in a chair, his limb remaining, meanwhile, comfortably suspended.

It will be observed that so far in my description of the anterior splint and its application I have said no word in regard to extension. I have, in fact, reserved it for special discussion, because I find myself compelled to differ with the distinguished inventor of the apparatus in regard to that point. His view is, that extension may be produced by the obliquity of the suspending cord, and that this acts continuously, the weight of the body, assisted by elevating the foot of the bed, acting as the counter-extending force. I think I am prepared to show, out of his own mouth, and by reference to certain well recognized mechanical facts, as well as by the authority of some very distinguished surgeons, that with regard to this point at least, Professor Smith entertained erroneous views. Extension, as used in

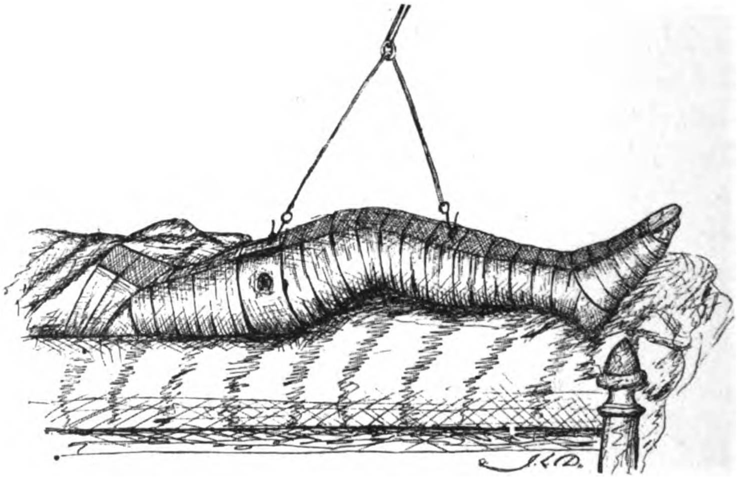

FIG. 9. SPLINT APPLIED FOR COMPOUND FRACTURES.

surgical discussion, means a force applied to an extremity below the seat of fracture, and constantly acting in the axis of the broken bone. And upon this understanding of the term depends the great difference in the principles upon which fractures of the femur are treated. Now, it appears to me, that as the bandages which secure the limb to the splint are applied in the same manner above as below the seat of fracture, and that in addition to this the splint is bandaged to the pelvis, whatever extending force is acquired from the obliquity of the cord is exercised as well upon the parts above as upon those below the break, and hence no difference in the relation of the broken fragments can be secured. Smith, himself, says: "The apparatus being secured to the pelvis, the limb is obedient to all the movements of the trunk, *and always preserves the same relation to it.*" Now, it is quite apparent to me that this preservation of the relation between the limb and the pelvis, precludes the possibility of change in the relation between the broken ends of bone. In fact, even if the splint was not made fast to the pelvis, extension could not be accomplished unless we should so apply the bandages that they would slip on the parts above the fracture, and hold fast on the parts below, a style of bandaging with which probably no one would have shown less patience than Professor Smith himself. Dr. G. E. Porter, of Lonaconing, Md., an ardent admirer of Smith's anterior splint, has long ago recognized this feature and has devised a modification of the instrument with a view of overcoming it. Dr. F. H. Hamilton, in his admirable treatise on "Fractures and Dislocations," says: "Whatever the advocates of flexion in fractures of the femur may say to the contrary, they are never able, in this position, to employ effective extension and counter extension. A careful examination of all the double inclined planes which have been devised, including Nathan R. Smith's and Hodgen's suspending apparatus—I say it with all respect for those distinguished surgeons—ought to convince any experienced observer that such is the fact." Again, "In Nathan R. Smith's anterior suspension splint, not even the weight of the pelvis is employed as a means of counter extension, the pelvis being secured to the splint by rollers equally with the thigh and leg, and there is no possible chance for extension and counter extension." I hope I have made my position clear upon this point, for upon it depends the propriety of my having considered Smith's anterior splint among those instruments which retain a reduced fracture in place until healing has occurred, rather than among those which produce extension during the process. I believe that the splint does something which, in a great majority of cases of fracture of the femur, is much better than continuous extension, and that is prevention of retraction, or, in other words, retention; and this is accomplished by means of the obliquity of the cord as well as by other means, which I will proceed to point out.

Continuous extension is coercion of muscles, and like all all other kinds of coercion excites a certain amount of irritability in the muscles so treated, and a corresponding amount of discomfort in the patient. Moreover, since it is clear that effective extension can only be employed in the straight position, the practice of it in the treatment of fracture of the femur entails that position which is an exceedingly disagreeable one. And, although I freely admit that there are certain cases of this fracture where great obliquity is found, in which this plan of continuous extension promises the best possible results, I am far from believing that its application is necessary in a great majority of the cases. If we know an instrument which will be sufficient for the case, and will at the same time relieve the patient from the discomforts of the straight position it is plainly our duty to use it. It is just as true to-day as it was a hundred years ago when Benjamin Bell said it, that "if the muscles of the limb are relaxed by making the limb form an obtuse angle with the body, while the joint of the knee is moderately bent, it is surprising with what ease we may, in most cases, place the bones in their natural situation;" and it follows naturally from this, that if by means of an apparatus we can maintain this flexion until sufficient time has elapsed, we can secure union without deformity. M. Mayor, in commending his own splint, which acts on the same principle with that of Smith, remarks: "All that is necessary, therefore, is to offer to the tendency to contract a resistance proportionate to the degree and mode of action." This he accomplished also by flexion. Smith, himself, says: "It will be observed that, in the method of treatment here described, the necessity of severe mechanical constraint is superseded by evading the causes of displacement rather than by contending with them." Moreover, without bringing to our aid such eminent surgical authority, it is quite evident from the anatomical considerations involved that we can, by performing and maintaining double flexion where the fracture is not extremely oblique, fulfil the great dogma of fracture treatment, i. e., put the broken fragments in apposition, and keep them there until union has occurred. In whatever part of the shaft the fracture may occur, it will be the psoas, iliacus and hip-muscles, assisted somewhat by the adductors acting from above, and principally the gastrocnemius acting from below, which produce displacement, and the hamstring muscles, aided by the adductors and rectus, which produce shortening. Double flexion approximates the points of origin and insertion of all these muscles, that is, relaxes them and proportionally removes the deformity produced by their contraction.

I think it fairly deducible from what has preceded, that in

Smith's anterior splint we have an apparatus belonging to the division which we may call retention instruments and the class of double inclined planes, which possesses features of the greatest possible clinical interest, and adds materially to the stock of our surgical armamentarium. I am not one of those who are disposed to ride hobbies, and I wish it to be distinctly understood that I do not look upon the apparatus under discussion as the only proper means of treating a fracture of the femur or leg, although that seems to have been the way of thinking in our city from the time of its invention until a very few years ago. Nay, I am even convinced that in the worst cases of this dreadful accident where the fracture is simple, when the obliquity is very great and the broken ends afford each other no support, one of the continuous extension methods would in the long run give better results. And in simple fractures of leg, unless there was a great degree of laceration of soft parts (in which case I would use it), I would greatly prefer one of the dressings which allow the patient to go about on crutches, and among which none has given me more satisfaction than the ingenious modification of Croft's method, lately devised by Dr. O. J. Coskery, of this city. But the apparatus philosophically meets all the indications presented in an ordinary fracture of the femur, and gives to both patient and surgeon, an amount of comfort scarcely known in the use of any other plan. It is in compound fractures, however, whether caused by gunshot wound or otherwise, that the splint is peculiarly efficient. However extensive the laceration of soft parts or comminution of the bone, we can keep the limb in good position, give the patient comfort, and by using an independent bandage at the seat of injury, always have access to the wound without disturbing the relation of the fragments or giving the patient pain. I have kept the patient comfortable and the limb in excellent position with the wounds exposed, in a case in which the tibia was ground to bits and the fibula broken in several places. After amputation (to which the patient refused to submit on admission), twenty-five pieces of tibia were counted.

Mayor, in speaking of his own apparatus, says: "With it is resolved this problem—so difficult that it seems almost a paradox—to treat a broken member even with the most untoward complications, by simple position without a splint, and to permit (at the same time) the member, without inconvenience or pain, to practice all the movements parallel to the horizon." This and more may be truthfully said of Smith's splint since, in addition to the advantages of Mayor's, it gives lateral support and a better adapted posterior surface for the repose of the member. The splint was exceedingly popular among the surgeons of the Confederate army. Chisolm, in his "Military Surgery," after discussing other methods of treatment, says: "A better method of treating fractures of the thigh is in the use of Smith's anterior splint or Mayor's posterior wire splint," and in another place: "In the hands of a nice manipulator Smith's anterior splint is the perfection of a fracture apparatus." Further on, speaking of compound fractures of the ankle, he says: "It is in this class of cases that Smith's anterior splint and Mayor's posterior splint will exhibit a long list of splendid triumphs, cures without deformity and the smallest amount of shortening, a painless treatment, allowing the patient to move about at will, and even to leave his bed the first week after the reception of the injury." Warren, in his "Surgery for Field and Hospital," also commends it. "By means of Smith's anterior splint the conjoined advantages of relaxation and extension may be secured. * * * The suspension of the limb precludes such displacements as are likely to occur in consequence of the movement of the body, thus securing a much greater latitude in that regard, and contributing materially to the comfort of the patient." Dr. Holloway in a discussion before the Medical and Chirurgical Society of Kentucky, published in the June number of the *Louisville Medical Herald* for 1880, says: "I had the honor to be the first surgeon of Richmond, Virginia, to apply Smith's anterior splint to a gunshot fracture. Without going into the details of this plan I will say that I have seen compound fractures of the thigh by gunshot, heal without suppuration, without any special treatment except suspending of the limb during the process of repair. I am satisfied that by its use I have saved a number of limbs which would otherwise have required amputation." It was also considerably used in the Federal army, as we gather from Hamilton's "Military Surgery." He says: "This splint was employed very much during the first two years of the war, and is still preferred by many surgeons; but, in our opinion it ought, except in few cases, to give place to Hodgen's suspension splint or some of the other forms of apparatus." Surgeons in civil practice have also from time to time commended the anterior splint in terms which are unequivocal. In 1858, Dr. Ephraim Cutter described it to the Massachussetts Medical Society, and gave a glowing account of the success with which he had seen it used by Smith himself in Baltimore. Probably the most flattering eulogy ever passed on the splint is that published in the Paris *Medical Gazette*, by MM. Schrimpton and Gantillon. Those gentlemen having used the apparatus in a very difficult case with success, came to the following conclusions in regard to it: "On the whole we aver that the apparatus of Professor Smith realizes at least the following advantages over every other system employed in the treatment of fractures of the lower extremity: (1) The extremities of the fragments are maintained in perfect apposition without the exercise of any constriction upon the limb. (2) In cases of extensive displacement of the fragments, extension is easily accomplished by the weight itself of the member, and the reduction accomplished by the *point d'appui* attached to the apparatus, and this without any dragging. (3) The method of suspension is exceedingly convenient for the employment of irrigation and for the dressing of all the wounds of the member, upon which we may practice all the operations necessary without disturbing the apparatus. (4) The heel being uncovered is exempt from pressure and from the acute pain which, in the use of other means, so often embarrass the surgeon. (5) The patient can change his position and raise himself in bed without inconvenience. (6) Finally, what is not least important, the apparatus of Smith is the only one which, even in the most severe and complicated fractures, allows the patient to be conveyed to any distance without exposing him to any danger and without causing him the least pain." Dr. Addinell Hewson, of Philadelphia, has recently called attention to the advantages of Smith's splint in treating fractures of the leg, and Dr. H. Black calls attention to it and to the success he has recently had in treating with it a case of fracture of the neck of the femur in a woman of 59. His case recovered with only perceptible shortening and a slight limp. It would be vain for me to give in detail the experiences of Baltimore surgeons in the use of Smith's splint, since it has been in high favor among all the teachers of surgery in this city, as far as I am informed, ever since its invention.

The impression which the splint has produced upon those who are acquainted with it is apparent from the number of surgeons who have produced modifications of it. These I do not propose to give an account of since it would unnecessarily increase the length of my communication. It may be well, however, to mention that the most important of these are recommended by Dr. Hodgen, of St. Louis, Dr. G. E. Porter, of Lonaconing, Maryland, Dr. O. J. Coskery, of Baltimore, Dr. Palmer, U. S. N., and Dr. T. W. Simmons, of Hagerstown, Maryland. Many other surgeons have produced modifications, but they do not concern us here. I have so far not put any of the modified forms to the test, and therefore should not speak too dogmatically in regard to them; but I can not see in what respect they improve on the original, and am therefore inclined to the opinion that they are in no sense improvements.

In saying what I have in regard to the anterior splint, I have been actuated by a desire to bring before the profession a subject, which it seems to me is too much neglected, and to call the attention of surgeons to an apparatus which may be a source of great satisfaction to themselves and comfort to their patients. I have attempted, and hope I have succeeded in discussing the subject from a judicial point of view, and while I heartily approve of the anterior splint, I should dislike exceedingly to be considered a partisan of it or of any other instrument. The conclusions at which I have arrived are based upon a philosophical consideration of the principles involved and supported by a sufficient amount of testimony from those who have put the matter to the clinical test to give them stability. My own experience has led me to adopt the anterior splint, as a rule, in the treatment of fractures of the femur. I have, from time to time, gravitated off to one or other of the different methods recommended. I have used the fixed splints of plaster, starch, etc., and while my cases have generally done well, I have found the treatment more or less unsatisfactory. I have also used Gurdon Buck's extension method, and should use it again in a case of extremely oblique fracture. But the position is uncomfortable to the patient, and unless there should exist especial indications for it I would deem it unnecessary. I have therefore found it to the advantage of myself and my patients to return to what, with me, is first principles. The meagre accounts which I find in Gross, Bryant, Erichsen, Holmes, and other systematic text-books on surgery which have come under my observation, convince me that the apparatus of Smith has not received the attention it merits, and I have no doubt that if surgeons would put it to the test in their practice they would find it possessed of all the good qualities we claim for it. It acts on well recognized surgical and anatomical principles, is cheap, simple, easy of application, allows the patient considerable freedom of movement, gives perfect access to wounds in compound fracture, without interference with the splint, and is for the general run of cases the best apparatus for the treament of fracture of the femur whether it be simple or compound, and of compound fracture of the leg. I wish, in conclusion, to express my appreciation of the kindness and artistic skill of my prosector, Dr. J. L. Doerksen, who made the drawings with which I have illustrated my remarks.

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PLASTIC SPLINTS IN SURGERY.[1]

BY SAMUEL N. NELSON, M. D.

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ALL plastic splints involve the same principle—admitting of application in a moist or pliant condition, and adapting themselves to the conformation of the parts before assuming their permanent shape. They are equally adapted to fractures, dislocations, chronic joint diseases, sprains, etc. To the Greeks, and heathen of unknown ages, belongs the origin of the idea; and plastic, immovable splints were in use in the time of Hippocrates, the Greek surgeons of his day being especially interested in the careful coaptation of fractures. To Baron Larrey (1830) belongs the reviving and methodizing of the practice; to M. Seutin (1834) the use of starch, and the extension of the principle to the treatment of deformities, diseases of the joints, etc., since which time many different materials, and variations in the application, have been suggested.

Plastic splints are of two kinds, the movable and the immovable or fixed. For the movable plastic splints various materials may be used—*e.g.*, gutta-percha, leather, Hide's felt, paper, pasteboard and bark. Strips of these materials of sufficient thickness may be shaped, and then softened by immersion in hot water, when they may be moulded to the limb. The only advantage which they possess over the ready-made splints of metal or wood in common use, is that a better fit can be obtained. Yet the usefulness of these is limited, for they do not encompass the limb in a perfectly-fitting casing, and the support is not equally distributed. The Bavarian, or book-splint, though called by Bryant immovable, is in reality one of the forms of movable plastic splints, since the nature of its formation and application consists in its being easily removed and replaced, and held in place by lacings or bandages. It is especially adapted to the leg and foot, and can be prepared with gum and chalk, or plaster of Paris. It consists, in brief, of flannel, stitched tightly to the limb with the seam in front, and over this the plastic material is applied. When dry it is ripped up, the edges trimmed, and eyelet-holes made for lacing. The immovable splints about to be described, having been slit up longitudinally, may have eyelet-holes made, and are then, in principle, Bavarian or book-splints. Seutin claims this idea, but it probably originated with Cheselden, who described it in 1761. It is not a good practice, however, although called by Velpeau "une des plus précieuses qualités de cet appareil." The splint is too much weakened thereby to give the proper support when the patient is up. Moreover, if the limb is atrophied, and a strip removed from the splint as recommended, when the edges are approximated, it is found not to fit well. It is better, therefore, to take it off entirely and put on a new splint. Another form of movable dressing was described by Dr. James L. Little, in the *American Medical Times* for 1861, and consists of anterior and posterior splints of plaster of Paris. He gives the credit of first proposing these to Maisonneuve, of Paris. This form of dressing has been in use of late at the Boston City Hospital, and is made by soaking two or three thicknesses of muslin, or thin flannel, in the plastic material, and applying to the limb in two strips, the posterior much wider than the anterior. It is easy of application, a good fit can be readily attained, and on removal of the anterior splint, which is made about two inches wide, the posterior, nearly enveloping the limb, keeps it in situ, and enables examination with a minimum of interference, unlike the Bavarian splint, or the common plaster bandage splint slit up longitudinally. The movable plastic splints are very good as far as they go —better than the ready-made splints, because they are made to fit the individual case, they are not as good as the immovable apparatus, which is perfectly adapted to the limb, giving uniform support and complete fixation of fragments, and restraining the patient much less than any other mode of treatment. The only valid preference for the movable splints is the easy inspection, enabling one to tell what is going on beneath. This, however, may be good practice at the beginning, but when you have confidence in your diagnostic skill, and the happy knack of rightly fitting your bandage, it is far best let alone.

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[1] An inaugural thesis presented to the Faculty of the Medical Department of Harvard University, June, 1881.

The different materials for the immovable dressings are also of considerable number. For instance, there are starch, dextrine, chalk and gum, glue, glue and oxide of zinc, paper, silica, tripolith and plaster of Paris.

It is to be borne in mind, when applying any of these different forms of immovable dressings to fractures, that extension and counter-extension, sufficient to keep the fragments in place, must be continued, not only while the plastic material is being applied, but until it has become sufficiently hardened to maintain them in place, the length of time varying with the different substances.

STARCH.—The starch bandages were introduced in 1834, by Baron Seutin, of Belgium. The starch is prepared for use by boiling in water a few minutes, and should be of the consistency of that used by laundresses. The whole limb is enveloped in a layer of cotton wadding, which is thickly laid along and over, the osseous prominences. A bandage, saturated with thick starch, is then firmly applied, and others added, according to the strength required. The whole is completed by starching the outside of the last bandage. Until the starch is thoroughly dried, which usually takes from thirty to forty hours, owing to the amount of moisture necessarily included, a temporary wooden splint may be applied to prevent displacement as far as possible. The drying may be somewhat hastened by the use of hot sandbags. The starch splint is light and inexpensive, and the materials are always at hand. It is, however, sticky in manipulation, and, to give sufficient firmness, usually requires stiffeners, such as pasteboard, hoop-iron or wire. These may be added to any of the plastic splints, but are seldom required with plaster, and only when much additional strength is necessary.

Compared with the plaster splint, starch has the disadvantage of hardening only after many hours, instead of a few minutes, and requiring extension until dry. And, as it contracts in drying, it is not so safe.

DEXTRINE.—Dextrine, which is preferred to starch by Velpeau, and which is in many respects superior to it, is a substance obtained by the continued action of diluted sulphuric acid upon starch at the boiling point. It is prepared by thoroughly mixing with it spirits of camphor or brandy, in the proportion of ten to six, and adding four parts of warm water, when the solution will be about the consistency of molasses. The application is similar to to that of starch.

GLUE AND CHALK.—The glue and chalk bandage is recommended by Bryant, who uses equal parts of gum-arabic and precipitated chalk, made into the consistency of thick paste by the addition of boiling water gradually stirred into it. This becomes firm sooner than starch and is more solid.

GLUE.—The glue bandage has been adopted by Mr. C.

de Morgan, in the Middlesex Hospital. He uses the best French glue dissolved in water, to which alcohol is added to induce more rapid drying. The application is similar to that of the starch bandage.

GLUE AND OXIDE OF ZINC.—Dr. R. J. Levis, of Philadelphia, introduced to the American Medical Association, in 1876, a dressing made of ordinary glue and oxide of zinc, and said that the glue, by this means, hardens with rapidity. "Too much oxide of zinc must not be added lest it make the splint brittle and liable to crack." Any kind of texture can be used with the plastic material. This makes a light, neat, firm dressing, and where not much tendency to displacement exists, as in fractures of the forearm, is desirable. It sets slowly, however, as compared with plaster, is less porous, and contracts considerably in drying.

PAPER.—Paper splints also serve a useful purpose. They are made by soaking pieces of shaped pasteboard and moulding them to the limb, around which are wrapped strips of stout paper, wet with water or with starch. It is less strong than the glue and oxide of zinc bandage, is slow in drying and only exceptionally to be recommended.

SILICA.—The silica bandage is made of the silicate of potash, or soda, dissolved in an excess of caustic alkali. The late Dr. T. B. Curtis, of Boston, reported, in the *Boston Medical and Surgical Journal* for June 28, 1877, that the silicate of potash is preferable to the soda salt, which requires very long to dry. A coating of the solution is applied with a brush to a dry roller bandage over the limb, and two or three more layers are added to give sufficient strength. The solubility of the silicate in water is an advantage, for it renders the removal of the bandage easy. It dries quicker than starch, but less quickly than plaster. It is lighter than plaster, but contracts in drying and is not so safe. It is also very sticky and disagreeable to manipulate.

TRIPOLITH.—The *New England Medical Gazette* for March, 1881, has the following, from the *Berliner Klinische Wochenschrift*, 1880: "After a series of experiments, Prof. von Langenbeck recommends tripolith for surgical purposes. It was discovered by Shenk, and consists of lime, silicon and oxide of iron. It is grey, of fine quality, lighter and more durable than plaster of Paris. The dressings harden sooner, and when once dry and hard never absorb any moisture. It is thus possible for patients to bathe while wearing the tripolith dressing. It is, besides, cheaper than plaster." Being desirous of finding the best material for these dressings, we obtained some tripolith from the importer in New York, Van der Emde, and have given it sufficient trial to condemn it, in our judgment, as a material suitable for plastic splints. It sets so quickly as to require haste in its application. It contains a harsh, gritty substance, and is not "of fine quality." It is much more expensive than plaster. It does absorb moisture, and is even worse in this respect than plaster, as shown by a splint applied to the leg of a little boy, whose urine caused it to granulate and come to pieces. Further trials with a fractured clavicle, and a Sayre's jacket made of tripolith, showed it to be utterly untrustworthy.

PLASTER OF PARIS.—Plaster of Paris or gypsum, the hydrated sulphate of lime, is prepared for plastic use by slowly heating it to between 212° and 392° (F.) to drive off the water of crystallization. It combines with water, forming a hydrate, and crystallizes or "sets," becoming in a few minutes quite firm and hard. The history of its use in surgery, as given by Dr. S. B. St. John, in his "Plastic Apparatus in Surgery" (*American Journal of Medical Sciences*, 1872) is, in brief, somewhat as follows: Its use among the Arabs, as a dressing for fracture, was described in 1798, in a treatise by Eaton, an English consul at Bassora. It was first introduced into Europe by Hendriksz, who used it successfully at the hospital of Gröningen. In 1816, Hubenthal applied it to a fracture of the forearm in the form of a plaster mould. Its formal introduction to the surgical world, however, as a material for treating fractures, dates from 1828, when experiments were instituted at Berlin, by Klüge, Dieffenbach, and Keyl. In 1831, William Beaumont introduced it into England, and it seems to have possessed moderate favor until 1854, when Pirogoff published a monograph, giving an account of its use in the Crimean campaign. This gave a fresh impulse to experiment. Mathiesen, of Holland, in 1854, published a monograph, in which he advocated rubbing dry gypsum into the meshes of a roller, which was to be moistened and applied like a dry bandage. "This," says Dr. St. John, "combines the firmness and solidity of the plaster with the tenacity of the cotton fibre, thus securing a firm and tough splint with a minimum of plaster, and, by consequence, a minimum of weight, with the additional advantage of application in a form which enables the surgeon to secure the most accurate adaptation to the limb under treatment." Lately, many improvements have been made in the method of preparation and mode of application by Dr. Henry O. Marcy, of Boston, to whom I am under personal obligation in the preparation of this paper. He has used plaster splints with great success, and has introduced his methods to the profession in a paper, entitled "Plastic Splints in Surgery," read before the American Medical Association, in 1877, in which he says: "As late as 1870, they were made by soaking pieces of felt or other material in the plaster, and coating the whole afterward with a thick paste of the same. At the last clinic of Langenbeck, which I attended, he was treating a broken leg with this dressing. The great improvement more recently adopted after the earlier recommendation of Mathiesen, consists in rubbing or rolling the plaster, when dry, into the bandage, and thus keeping it ready for use, in a close tin, until required, when it should be placed in a vessel of warm water sufficiently deep to cover it, and as soon as bubbles of air have ceased to escape it is ready to be applied."

Inasmuch as the results in the use of plaster splints depend much upon the minutiæ of preparation and mode of application, we describe it somewhat at length. As regards the materials, the plaster must be of fine quality, such as is usually furnished for dental use, freshly calcined and carefully protected from the absorption of moisture from the atmosphere. The kind of cloth employed is of importance, both for the immediate and ultimate success. It must be sufficiently strong and of such a texture as to take up and retain plaster easily. After many experiments with different kinds of cloth, Dr. Marcy has decided that the cheap bleached cotton cloth used for printed calico, meets more of the demands than any other, if used before it has received the dressing. To procure cloth at this stage of manufacture one must go to the bleacheries. It is then free from the vegetable oil with which each fibre was covered, and has not received the filling of earthy and starchy compounds necessary to give the firmness required in finishing, and is equivalent to the surgeon's absorbent cotton. It is the right texture to take up plaster and retain it. It gives the maximum of strength, and when applied it forms a kind of felt, which does not crack, but rather wears out if subjected to friction, as over the heel.

To test the strength of plaster splints made with different kinds of cloth, Dr. Squires, interne at the Boston City Hospital, made cylinders, and, placing them on end, found the force with which each was crushed *vertically*. His results were as follows:

Cloth.	Length in Inches.	Diameter in Inches.	Layers of Bandage.	Crushing Force in Pounds.
1. Mosquito Netting	3	2.5	2	53.5
2. " "	3	2.5	3	88
3. Crinoline................	3	2.5	3	300
4. "	3	2.5	4	380
5. Cotton Cheese Cloth.....	3	2.5	3	175
6. Linen " "	3	2.5	3	616
7. Gauze..................	4	3.25	2	42.5
8. "	4	3.25	4	85
9. "	4	3.25	6	160

Thinking these experiments, although very instructive, insufficient, we made cylinders 12 inches long and 2 inches in diameter, which were crushed in the laboratory of the Massachusetts Institute of Technology, with the force applied *transversely* to the middle of the splint, suspended by supports at the ends. The results were as follows:

FIRST SERIES.

Cloth.	Layers of Bandage.	Weight of Splint.	Crushing Force.
1. Cotton Cheese Cloth	4	2 oz.	4 lb. 10 oz.
2. " " "	6	3 "	9 " 12 "
3. Linen " "	4	4 "	47 " 4 "
4. Crinoline....................	4	2 "	35 " 4 "
5. "	6	3 "	60 " 4 "
6. Dr. Marcy's Cloth..............	4	5 "	91 " 12 "
7. " "	6	6 "	111 " 12 "

SECOND SERIES.

1. Dr. Marcy's Cloth..............	2	1.75 "	23 " 0 "
2. " "	4	3.5 "	50 " 0 "
3. " "	6	5.5 "	75 " 0 "

A glance at the first series, tested under uniform conditions, shows that Dr. Marcy's cloth gives a maximum of strength with a minimum of material. The second series, tested under other uniform conditions, gives the ratio between the layers of bandage, the weight of splint, and the crushing force.

The common mode of filling the meshes of the cloth with plaster, by rubbing it in with the hand or knife, is not only dirty and disagreeable, but imperfect and uneven. Too much plaster annoys in manipulation, besides making the splint heavy and liable to crack, and too little, renders it less firm and compact than is desirable. These difficulties are avoided by using a bandage roller (Fig. 1) made under the direction of Dr. Marcy, which gives a hard and even bandage, by distributing the plaster uniformly upon both sides of the cloth, drawing it from below upwards through dry plaster. These instruments are manufactured by Codman & Shurtleff, of Boston, are inexpensive, easy of management, and satisfactory in the result attained.

The part is wrapped with some light, soft material of uniform thickness, which, by its elasticity allows, to a certain degree, for the shrinkage of the limb after the swelling has subsided, and keeps up more equable support. This is well attained by a single layer of white sheet-wadding, lightly and uniformly applied.

Commence rolling the moistened plaster bandage at the extremity of the limb, independent of the seat of fracture, and continue it so as to secure the immobility of the articulation above the point of injury, thereby preventing œdema of the extremity. Plaster, if of good quality, will become firm in about ten minutes, during which time the limb must be in right position. Then it may be left uncovered until dry.

The plaster dressing is a little heavier than some of the other plastic apparatus, but it combines advantages in other respects, which make it superior to them. It is cheap, and easily obtained. It can be readily applied, and sets rapidly, thus forming *at once* a perfect case for the limb, and obviating the necessity for the maintenance of extension during the process of drying. It is also porous and does not, in any way, interfere with the insensible perspiration. Moreover, it does not contract in drying, contrary to the statements of most authors.

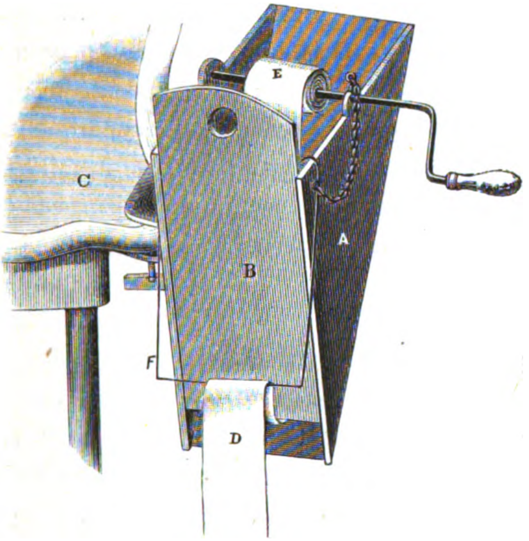


FIG. I. DR. MARCY'S PLASTER BANDAGE ROLLER.

The mill (*A*) is secured upon the table (*C*) ; the slide (*B*), pushed down, holds plaster on both sides of the bandage (*D*) which is rolled up at *E*.

A fixed dressing may be cut longitudinally, on one side, by various means, and removed like a shell from the limb. It may be divided by a sharp, strong knife, cutting to the wadding, obliquely, or by Seutin's scissors, with their various modifications, or by an ingenious instrument made by Collin et Cie., which consists of a circular saw moved by a ratchet.

The objection to the use of the plastic splint most common with the profession, in the immediate application to fractures, is the œdema resulting from injury. Besides the rupture of vessels, this is, in large share, produced by the impairment of the venous return-current, resulting from displacement, irregular pressure, and consequent muscular irritability. Careful adaptation and uniformity of support reduce œdema to the minimum, and it is a well-established clinical fact, that a properly applied plastic splint to a very recent fracture is followed by little or no disturbance of the circulation.

Strangulation, and even fatal gangrene, have been known to follow the improper application of fixed dressings; but this should not prevent their use when their advantages are so very apparent. If it does occur, gangrene is sudden and unheralded. The patient complains of no pain. The swelling having increased enough to fill the mould completely, the superficial venous circulation is arrested, and, from this moment the process of strangulation proceeds with great rapidity. All circulation is soon cut off, and, it is in effect, an Esmarch's bandage. We must not, however, use the *post hoc ergo propter hoc*, argument here any more than elsewhere. Because the improper use of a fixed dressing has, in a few instances, been followed by gangrene, and the number on record is not large, they should not be condemned. The patient should be visited within twenty-four hours, and careful inspection of the limb be made.

The bandage should be removed at once if there is swelling of the fingers, or toes left exposed; if they become purple, benumbed or cold, the circulation is impaired, and there is compression. Even without these symptoms, continued pain is sufficient indication that something is wrong.

It has been urged that the atrophy which must ensue in a fractured limb, is a weighty objection to a fixed apparatus; that the want of support which follows will allow a slipping or lack of coaptation of fragments, and thus shortening result. When it is remembered that a properly fitting splint holds in fixation the irregularities of both distal articulations, that the repair processes of osseous structure, in parts held at rest, commence at once, and continue uninterruptedly until complete; and that, moreover, atrophy is a secondary and slowly ensuing process, it will be seen that these objections have as little of theoretical as clinical foundation. Atrophy occurs in a limb that is simply carried, even if not confined in a casing, as all know, because non-use impairs nutrition. Another and more valid objection is, that fixed splints cover bad surgery. If one is sure of his diagnosis and makes himself thoroughly familiar with the details of treatment by plastic apparatus, he will secure good results. "I claim," says Dr. Marcy, "that any man of moderate mechanical skill—and one not possessed of this has no right to practice surgery—can, with a little care, learn to apply plastic splints well."

On the other hand, there are certain decided advantages in the use of the immovable apparatus. From its very nature it makes perfect coaptation to the irregularity of the contour of the limb, which is a positive help and guarantee for immobility. It gives uniform support, and causes no injurious pressure over bony prominences. This uniform support is one of the great advantages. We thereby prevent spasms, secure muscular rest, and avoid swelling; yet, such a splint is dangerous in careless hands. The immovable dressing ensures complete fixation of the fragments, and allows the freedom of the patient, letting him go about on crutches or otherwise. Not only is the tiresome confinement of weeks in bed obviated, but the nutrition of the injured limb is better secured.

In regard to the time when a plaster splint should be applied, although many able authorities prefer to wait until after the swelling has subsided, yet there is abundance of evidence from Larrey, Velpeau, Seutin, Erichsen, St. John, and Marcy, to show that it can be applied immediately after the injury, not only with perfect safety, but with better results. The plaster dressing is applicable to all fractures of the long bones, of the clavicle and ribs, and to acute fractures of the spinal column.

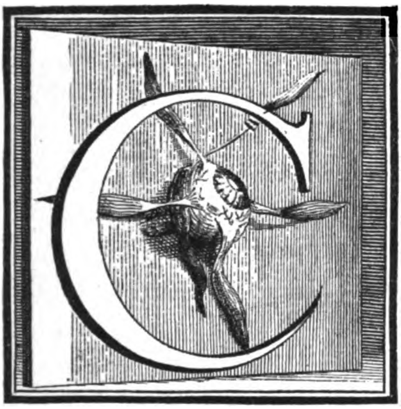
HISTORICAL AND BIBLIOGRAPHICAL NOTES.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M. D.

XVI.—AURELIUS CORNELIUS CELSUS.

B. C. 25—A. D. 40 (?).



CELSUS was not a practical anatomist; his writings on this subject are very meager and brief. They are chiefly contained in the first chapter of Book IV, under the head, "Of the internal parts of the human body"; and in Book VIII, Cap. I, which is entitled, "The Form and situation of Bones." It will be interesting to note, as we pass through his works, the extent and character of his descriptive anatomy.

That a knowledge of anatomy was regarded as essential to the physician and surgeon in the time of Celsus, we find satisfactory evidence in the preface of his work. In speaking of the emulators of Asclepiades, he says: "Since pains and various kinds of diseases may arise in the internal parts, they consider no one capable of applying the proper remedies to those parts of which he may be ignorant; hence, the

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necessity of dissecting the bodies of the dead, and examining very minutely their viscera and intestines." Then follows his account of "the plan adopted by Herophilus and Erasistratus"—viz.: the dissection of living criminals, "obtained by royal edict out of prison" for that purpose. I will not repeat the quotation of this paragraph, which the reader will find in my sketch of Herophilus and Erasistratus (ANNALS OF ANATOMY AND SURGERY, vol. iv, p. 35, July, 1881). Following this quotation, I stated that Celsus wrote approvingly of this atrocious practice. A more careful and extended reading of the preface proves that I was in error as to his personal views concerning this mode of obtaining anatomical knowledge. Celsus was obviously not very much in favor of practical anatomy, even when studied from the cadaver in the dissecting room. In another section he says: "But, indeed, those things of which we have spoken are only superfluous, but that which remains is even cruel; to lay open the abdomen and præcordia of living men, and that science, which presides over the health of mankind, is not only made the instrument of death, but that of the most atrocious; especially when some of these things, which are sought after with so much cruelty, cannot be known at all, whilst others may be examined even without any violence; for the color, smoothness, softness, hardness, and such like, are not the same in a wounded body as they were in a sound; because, even in bodies that have received no violence, yet these qualities are often changed by fear, grief, hunger, indigestion, lassitude, and a thousand other trifling affections; and it is much more probable that, the internal parts being very tender and never exposed, even the light itself might effect a change by severe wounding and laceration. Nor can anything be more absurd than to suppose the part to be the same in a dying man, nay, already dead, as it is in a living person; the abdomen may be laid open, it is true, even while the man is breathing (which does not strictly bear on the case), but as soon as the knife has approached the præcordia, and the transverse septum is divided, which separates the superior from the inferior (which the Greeks call diaphragm), the man immediately expires; consequently the præcordia and all the viscera present the same appearance to the slaughtering physician as those of a dead person, not such as they were while he lived; therefore, the only object attained by the physician is that of murdering a man cruelly, not that he can ever ascertain their nature and functions as we have them in life; yet, if there may be very interesting phenomena to be subjected to the view, in the man as yet breathing, practitioners have frequent opportunities of meeting them by accidents; for sometimes the gladiator in the arena, a soldier in the field, or a traveler intercepted by banditti, is wounded in such a manner as to display some of the interior parts, and so other parts in other persons: thus the prudent physician discovers their structure, relative position, arrangement, figure, and the like, not by perpetrating murders, but endeavoring to restore health, and learns that by compassion, which others have discovered by unrelenting cruelty. And for these reasons (I consider it) unnecessary to lacerate even the dead, which, though not cruel, yet it may be disgusting, since most things are found very different in dead bodies; even the dressing of wounds themselves may show all that can be discovered in the living."

At the close of his preface, Celsus speaks much more decidedly of the value and necessity of practical anatomy. "I think, certainly, medicine ought to be rational, but to be directed by evident causes, all the latent being rejected, not from the contemplation of the artist, but from the art itself. And to dissect the bodies of living animals is both cruel and superfluous; but the examination of dead subjects is imperatively necessary on students, for they ought to know the position and order of the parts, which are demonstrated with greater facility in dead bodies than in a living and wounded man. As for the rest, practice itself will point out such things, which can only be learned on the living, by the dressing of the wounded more slowly, but a little more tenderly." (Lee's translation, v. i., pp. 23, 24.) This last sentence is rendered more clearly by Greive (Ed. 1756, pp. 20, 21), as follows: "But, as for other things, which can only be observed in living bodies, practice itself will discover them in the cure of the wounded, somewhat more slowly, but with more tenderness."

The first chapter of book fourth is entirely devoted to the anatomy "of the internal parts of the human body." It contains brief descriptions of the trachea, lungs, heart, diaphragm, liver, spleen, kidneys, bladder and urethra, stomach and intestines, and of the omentum.

The osteology of Celsus is quite complete and remarkably accurate. It must have been written from a direct examination and study of the entire human skeleton. It will be found in the first chapter of book eighth. He describes all the principal sutures of the head with admirable precision. Nearly every bone in the body is described. The twenty-four vertebræ are divided into three classes: seven cervical, twelve dorsal, and five lumbar. The peculiarities of the atlas and of the vertebra dentata are carefully noted and made to explain the forward, backward, and rotary movements of the head upon the spinal column. The following is an example of his descriptions: "The third vertebra has eminences by which it is connected with the next inferior one. All the others are articulated with those below by processes inclining downwards, and by corresponding depressions which they have on each side they receive the superior ones, and are secured by many ligaments on each side, and an abundance of inter-articular cartilage. And thus a moderate degree of flexion is readily given to a man as he stands erect, and is as readily counteracted when the necessity of his operations require him to bend."

Thus he goes on to describe the several bones of the body and to indicate their functions. The muscles and ligaments are only mentioned in a general way, no attempt being made to use special names for any of them. In these anatomical chapters we meet the same names of parts which are employed at the present time, the students of to-day are repeating the technical terms which were familiar to the students in the first century, and in some instances to those of the Alexandrian school, several centuries previous to the Christian era. Celsus frequently gives the names which the Greek anatomists had already applied to the different structures of the body. Diaphragm, peritoneum omentum, jejunum, pylorus, ureter, zygoma, vertebra, femur, and cartilage, are among the terms alluded to.

Besides the chapters on anatomy already mentioned, we find descriptions of organs, more or less complete, in connection with special surgical operations required to be made on those parts. There will be found an account of the eye (Lib. vii., cap. 7), when discoursing upon cataract and its treatment by operation.

Before proceeding to make some quotations from this chapter I will furnish the reader with what Celsus considered to be the necessary qualifications of a surgeon (Lib. vii., Prefat.):

"A surgeon ought to be young, or at least not far advanced in years; to have a firm, steady hand, and never liable to tremble; to be no less dextrous with the left than with the right; to have an accurate and penetrating sight; an intrepidity of mind sufficient to bear up against the shrieks of his patient, yet compassionate to him whom he has undertaken to cure; he should neither hasten more than the case requires, nor cut less than is necessary; but, to effect his purpose in every case, as if he were immovable by the importunities of his patient."

Concerning cataract, Celsus tells us: "when recent, it is frequently removed by medicines; but, when it has become chronic, it requires a manual operation, which may be among the most delicate in surgery. Before I treat of this operation, it is necessary that I should give a short description of the nature of the eye itself, the knowledge of which, as it is of importance in several other parts, has an especial reference to this."

His description of the structure of the eye, his account of cataract, and his directions for the performance of the operation of couching, are all so remarkably good, and so extremely interesting, in view of the fact that eighteen and a half centuries have elapsed since they were written, that I feel justified in quoting all that he has written concerning them. I am certain that my readers who are not familiar with the works of Celsus will enjoy these extracts far more than they would a mere analysis of his opinion and practice. I will abstain from lengthy commentaries and comparisons of ancient knowledge, opinions, and methods with those of the present time, as the reader will readily observe all these points for himself:

"Now the eye has two external coats, the exterior of which is called by the Greeks, keratœides. This, where it forms the white of the eye, is pretty thick, near the pupil it becomes thinner. The interior tunic is united to this in the centre, where the pupil is; it is concave with a small aperture; round the pupil it is thin, but this coat is thicker a little distance from it; and this is named by the Greeks, choroides. These two tunics surround the internal part of the eye, and unite again posteriorly, where they become thinner, pass through a foramen, which is between the bones, to a membrane of the brain, and are there united to it. Directly under these, opposite to the pupil, there is a void space; then, below that again is an exceedingly fine membrane, which Herophilus named Arachnoides. The middle part of this is hollow, and in this cavity a substance is contained, which, from its resemblance to glass, the Greeks call Hyaloides. This substance is neither liquid nor solid, but a concreted humor, from the color of which that of the pupil is either black or grey, although the external coat be entirely white. This is enclosed by a small membrane, which proceeds from the internal part of the eye. Immediately under these is a drop of humor resembling the white of an egg, from which proceeds the faculty of vision; by the Greeks it is called Chrystalloides.

"Now, the humor beneath the two tunics, where I have described the vacuum to be, becomes concrete (*or opaque*) either by disease or from a blow; this gradually becomes indurated, and opposes the interior faculty of vision. There are several species of this disease; some are curable and others resist every remedy. For if the cataract be small, immovable, of the color of sea-water, or of polished iron, and admit of some sensation of light at its side, there is hope. If it be large, if the black part of the eye be altered from its natural configuration to any other, if the color of the cataract be azure, or like gold, if it glide backwards and forwards, it is scarcely ever cured.

"It is generally worse in proportion to the severity of the disease from which it has arisen, or from severe head-ache, or from a violent blow. Neither is old age a proper time for a cure; for, independent of any new disease, the vision is then dull; nor even childhood; but the middle age between these. Neither is a very small eye, nor one that is hollow fit for the operation. There is also a state of maturity at which the cataract itself arrives. Therefore, we must wait until it appears to be no longer fluid, but to have concreted with a certain degree of hardness.

"Previous to the operation, the patient ought to be put on a spare diet, to drink nothing but water for three days, and the day previous, to abstain from everything. After these preparations, he is to be seated in a light place, with his face towards the light in such a manner that the physician may sit opposite to him, a little more elevated; but an assistant should stand behind the patient that he may hold his head immovable, for by a slight motion the sight may be lost for ever. Besides, the eye to be operated on must be held more steady by applying wool on the other eye, and binding it on.

"Now, the left eye must be operated on by the right hand, and the right eye with the left hand. Then a sharp-pointed needle, perhaps not too slender, is to be directed straight through the two external tunics, at the intermediate point between the pupil and the temporal canthus of the eye, opposite the centre of the cataract, care being taken to wound no vein. It should not be introduced with timidity, because it enters a void space; for a person of very moderate skill cannot but know when he has touched it, as there is no longer any resistence to the instrument. When it has reached the part, the needle is to be inclined towards the cataract itself, and gently moved up and down there (*or rotated*), and the operator ought to depress gradually below the region of the pupil; when it has passed the pupil it should be pressed a little more forcibly, that it may sink to the inferior part. If it remain there, the operation is completed; if it rises again it must be more cut with the same needle, and divided into several pieces, which, being in separate portions are not only more easily concealed, but obstruct vision less. After this the operator must withdraw his needle in a straight direction, and the white of an egg spread upon wool, laid on it, and over that something to restrain inflammation, and so bound up.

" Afterwards, there is necessity for rest, abstinence, mild unctious medicines, and food (which will be given sufficiently soon the next day), at first liquid, lest the jaws be too much occupied; when the inflammation has subsided, he may take such food as I have ordered in wounds. To which it must be added, that the patient's drink must necessarily be water for a considerable time."

This is certainly a very remarkable and an extremely delicate surgical operation to have been performed in so remote a period of antiquity. The instructions for the performance of the operation, which are laid down by Celsus, are a model of simplicity, conciseness, and accuracy. It is impossible to contemplate the skill of the Roman surgeon of the first century of our era without emotions of astonishment and admiration.

[To be Continued.]

EDITORIAL DEPARTMENT.

A CONTESTED PRIZE.

Mr. Keetley has involuntarily become notorious, and his book [1] has become the best advertised book of the day. The good old days—when a mutual understanding among our enterprising literary buccaneers caused them all to work in harmony, and mutually to let alone whatever prize had been marked out for his own by another—seem to have passed away, and the spectacle is now presented of these adventurous spirits quarreling among themselves over their prey, and striving to cut each other's literary throats. There is much food for thought and ample scope for moralizing in the present condition of the medical book publishing interests of Great Britain and the United States, and Mr. Keetley's book would afford an excellent text for a homily ; it is by no means solitary, nor are American publishers the only ones who fly the freebooting flag on the literary main, and count as their lawful prey everything which is not protected by the flag of their own country. The cheap Leipsic editions of English authors are still zealously inquired for by the customs officials at the British frontiers in the same breath with their inquiries for cigars and tobacco. The Health Handbooks of a Philadelphia house have been transmuted into the Long-life series of a London firm, without even the decency of an acknowledgment of their source, bodily stolen and altered only in such matters as would otherwise have betrayed their American origin. Our friend, Dr. George R. Cutter, compiles with infinite labor and care, and publishes in New York a Dictionary of the German terms used in Medicine, and is amazed to find it republished in London as the work of Dr. Fancourt Barnes, a piece of literary piracy that excites admiration for what an American would call the unparalleled "cheek" of its execution. History repeats itself; and this experience of Dr. Cutter brings to mind the similar performance of William Cowper two hundred years ago, when he sent over to Amsterdam and bought 300 sets of the matchless anatomical plates of Bidloo, and then published them in London under his own name, after having the escutcheon on the engraved title-page, which bore the name of Bidloo, skillfully overlaid with a slip on which the name of William Cowper was printed. The medical chronicles of the day still preserve for us the record of the wrath of the doughty Dutch surgeon at this rape of the plates, and of the epithets which the addition of certain red reference letters upon the figures enabled him to use in his denunciation of the act to the Royal Society of London. Cowper, however, did have the grace to give due credit to Bidloo for his plates in the preface to his publication, which was more than our " modern instance" has done.

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[1] An Index of Surgery : being a Concise Classification of the Main Facts and Theories of Surgery, for the use of Senior Students and others. By C. B. Keetley, F.R.C.S., Senior Assistant Surgeon to the West London Hospital ; Surgeon to the Surgical Aid Society. Crown 8vo, 10s. 6d. London : Smith, Elder & Co., 16 Waterloo Place.

The same. New York : Bermingham & Co., Publishers, 1260 and 1262 Broadway. 1882. Price, $1.

The same. New York : William Wood & Co., Publishers. In one octavo volume 328 pages, bound in fine cloth, price, 50 cents. ☞ This work is announced to form one of the monthly volumes of Wood's Library of Standard Medical Authors for 1882, but it has been concluded to substitute some other and more valuable book in its place. It is hardly necessary to say that the price at which this book is now sold, namely 50 cents, is fixed, for certain reasons, without any regard to cost.

American medical book publishers seem to find at present great gain in reprinting the works of foreign authors ; and the American profession are being called upon to admire and gratefully acknowledge the benevolence which prompts the placing at their disposal, at such low rates, of whole Systems of Medicine, and of Surgery, and of classified medical libraries. The absence of any general copyright law having made the product of the labors of our transatlantic brethren the lawful prey of anyone in this country, and the import duties being large enough to discourage importations, a free course is left for a raid whenever and wherever there is money to be made.

A certain unwritten law of comity among publishers, we understand, has existed, which provided that whenever one firm announced an intention of reprinting any work, other firms were to refrain from meddling with it. But of late an Ishmael has arisen who acknowledges no such law, and has gone into the reprint business and cut under in prices ot such an extent that the whole business is threatened. *Hinc* *illæ lachrymæ!* Hence the rival editions of the "Index of Surgery," and the meaning of the announcement "that the price at which this book is now sold, namely fifty cents, is fixed, for certain reasons, without any regard to cost." There is but one outcome to this sort of thing for which the physician can pray—viz.: that the fight shall continue until, like the Kilkenny cats, there shall be nothing left of either. This whole reprint business is a monstrous wrong—a wrong upon the author, whose work is appropriated without so much as a "by your leave," and a wrong upon the profession in this country, which is discouraged from home production by the lack of pecuniary reward to be gained by it. In that good time coming, when an international copyright shall protect equally all authors, and when free trade in books shall put every production on its own merits, authorship will be more honorable and more remunerative; and, we venture to predict, an American medical literature will be created that will suffer by comparison with none.

An examination of the book of Mr. Keetley sustains the good judgment manifested by the publishers in selecting it for reprinting. The author in his preface describes his purpose as having been to compile a short book containing the main facts and theories of surgery, put concisely, classified and arranged in due order, and without superfluous explanation, for the special use of students coming up for examination, to give form to the nebulous knowledge remaining in their minds after the study of text-books. The author, questioning the value of the series of notes taken by a medical student with unripe knowledge and immature judgment—for to make good notes demands some practical experience and breadth of view—offers this book as a substitute for such notes. The subjects treated are arranged alphabetically, beginning with *Abdomen, Contusions of*, and ending with *Wounds*. In an appendix Osteotomy, Ovariotomy, Toothache, and Ophthalmic Surgery are separately considered. Each subject is treated in a manner that may be called one of compressed conciseness, worthy of a practiced telegram writer, and yet with a degree of comprehensiveness that leaves but little to be desired in a book of this kind. Throughout it is apparent that the author has employed in his task the practical experience and breadth of view described by himself as needful to a note-taker, so that the book is entitled to a rank above that of mere compilation. Here is what he says about the treatment of sprains, which we commend as full of common sense :

> "Methods apparently diametrically opposed succeed with these injuries. In the great majority of cases nature is thoroughly competent to cure sprains unassisted. Many people 'walk them off,' as they say. Sprained thumbs habitually get what is really not reatment at all ; yet, common and severe as they are, how rarely any permanent harm comes from them ! On the other hand, almost all the surgical authorities, alarmed by the number of joint diseases and the like, which are attributed (truly, no doubt) to neglected sprains, warn us to fix sprains with wooden or iron splints for weeks. There may be some doubt about the amount of harm to be really attributed to treating sprains by motion ; but there can be no question whatever about the mischief done by the abuse of rest. Bone-setters depend for their living upon the orthodox and blind worship of splints"

In the pages devoted to the consideration of diseases of joints, his descriptions of the signs of articular ostitis cannot be considered as coming up to the general tone of the book, since it omits any mention of the two signs most important of all which mark this affection—viz.: reflex spasm and reflex atrophy of the muscles that fix the affected joint, conditions that are sufficient to determine a diagnosis when other signs may be absent or uncertain. Considering that this work is intended to be an index to the whole field of surgery it is remarkable that there is so little to unfavorably criticise. One of the best things about it is that by its frequent hints, suggestions and references it is continually reminding the reader that it is but an outline, and not a complete treatise ; its influence being to encourage broad reading and extended study. In this it is unlike the ordinary digest or manual or compend, the shallowing influences of which are at the present time so seriously felt. As a final example of the tone and sentiment of Mr. Keetley may be quoted a part of his section on the treatment of wounds, which runs thus :

> "Read Gamgee on the "Treatment of Wounds,' an authority on oakum and cotton-wool dressings, but unjust to Lister and his methods. Without antiseptic treatment, grand statistical results have been obtained by various surgeons ; but, considering how many things affect the success of surgical practice, *e.g.*, experience, observation, judgment, resource, manual dexteri y, pluck and, perhaps, above all, patience and enthusiasm, not to mention endemic and epidemic influences, it is certain that *mere* statistics prove little for or against any system of dressing wounds, unless those statistics extend over long periods of time, different localities, and im-

mense numbers of cases. And even then, they should not be permitted to overrule other evidence such as presents itself to the surgeon who,in London, at all events, watches any small series of wounds in detail, of which some are treated antiseptically and others not. For even the statistics of an honest observer have not really the force of mathematical certainty. Behind them is always the human heart, whose truth is often noble but never mathematical. These remarks are not uncalled for. Repeatedly, of late, have the student and the practitioner been invited to deprive themselves and their patients of the safeguards offered by modern science, on the strength of a comparison between the statistics of *two places only*. Such a comparison no more furnishes an argument against Listerism than the security of those Acadian farmers, who had 'neither locks to their doors nor bars to their windows,' condemns the use of the Metropolitan police."

The "Index of Surgery" is a book conceived in the spirit of true helpfulness to the student, and its execution is worthy of full commendation. We wish we might have had it fifteen years ago for our own use. LEWIS S. PILCHER.

MEADOWS' MIDWIFERY.[1]

Few departments of medicine show greater progress than the obstetric art. The remarkable growth and development of gynæcology in the last few years, and the equally exceptional advances in surgery, have, of necessity, reflected light upon and added new truths to a kindred subject. Under this stimulus, with generous rivalry, each of the great nations has contributed to our common stock of knowledge, and the works upon midwifery, published recently, mark an era in the history of medicine.

Judged from this high standard, we examine a new and professedly complete work upon Obstetrics, not alone to complacently notice this progress, but confidently expecting to see mirrored therein all the really valuable results of original workers in this field of inquiry. From this standpoint we are surprised that so careful a scholar, as we know Dr. Meadows to be, should have incorporated so little that is new in the chapter on conception and gestation.

The question of the development of the placenta, its anatomy and physiological function, and the nutrition of the fœtus, is, illustrations and all, a reproduction of former teaching, with a seeming utter ignorance of the interesting and very important demonstrations of Sterling, of Edinburgh, and Montgomery, of Dublin, of the earlier date; Bischoff and Milne Edwards, and especially of Professors Wm. Turner, of Edinburgh, and Ercolani, of Bologna, of the present time. "The placenta is simply a mass of blood vessels, having no other structure whatever in its composition. It will thus be seen that there is no direct vascular communication between the mother and the fœtus, and hence all the eliminative changes necessary for the depuration of the fœtal blood, and the passage of all nutritive materials required for the growth and development of the fœtus take place by endosmosis through the ends of the fœtal tufts which are being constantly bathed by maternal blood, and thus act the part of both stomach and lungs to the fœtus. The two bloods are kept apart by three structures—the capillary wall, the containing membrane of the tuft, and the lining membrane of the placental sac, which is a maternal structure."

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[1] A Manual of Midwifery. By Alfred Meadows, M.D., F.R.C.P. Fourth edition, revised and enlarged. Illustrated by 136 wood engravings. G. P. Putnam's Sons, New York.

The fundamental idea of the placental function is a villus of secretion (maternal) and a villus of absorbtion (fœtal), as seen in the diffused placenta. This unity of type in placental development is never lost, although the relation of the villi may be by intimate cohesion instead of simple contact. In the first instance, the form of a glandular organ is manifest, but, in the latter, the glandular character is concealed by the close union between the vessel of the absorbent villus and the epithelium of the secretory villus. In the human species the vessels of the maternal villi become remarkably dilated and form the large lacunæ. These have been the chief, if not the only stumbling-block to exact knowledge of the structure of the human placenta. The belief that the lacunæ were really large cavities, as they had the microscopic appearance of being, and not the maternal vessels greatly dilated, was held as truth, proved and indisputable. It was through this belief that two other deceptive appearances were received as demonstrated facts—viz., that the villi floated in the maternal blood, and that the epithelium covering them appertained to the fœtus, instead of the mother. Hence generated the physiological error that the nutrition of the fœtus, not only in the human species, but in all mammals, took place through an osmotic exchange of the two bloods.

Upon pages 85 and 86 diagrams from an older author are reproduced, showing the development of the uterus during pregnancy. Here is repeated the old error of the little part which the cervical portion of the uterus takes in the development process. The plates of William Hunter show the extraordinary development which the cervical portion undergoes, a fact which even this careful observer failed to recognize, and only recent studies upon sections of frozen subjects, and other demonstrations have taught. The importance of the recognition of this anatomical fact, and its bearing upon irregular contractions in labor, as illustrated in Trismus and Tetany, is of manifest importance, although not touched upon in the work before us. Chapter IV, upon "Mole Pregnancy," is an example of the necessity of a thorough knowledge of the anatomy and physiology of the placental development. Only thereby can we know the departures from normal type, which, with all their pathological variety and clinical interest, are grouped into a short chapter of five or six pages under this effete heading. It is necessarily imperfect, and, in a large number of its conclusions, misleading.

The chapter on the very interesting and obscure subject of "Signs and Symptoms of Pregnancy," is full and fairly satisfactory. Definite guides for the knowledge of the pregnant state during its early stages are undoubtedly wanting, although such knowledge, at times, is of the first importance. We are surprised that the thermometer test of the cervical canal, as compared with the rectal temperature, is not referred to. In a very considerable number of cases we have found the temperature about one degree higher in the cervix, and have come to regard this as an excellent guide. We have, however, met with two exceptions, at least, in which there was no difference between the rectal and uterine temperatures.

Septic dangers in the puerperal state, and their means of avoidance, are recognized as of the first importance, and a due regard to antiseptic precautions is enjoined. The chapter upon Cæsarean section is very satisfactory, closing with a brief reference to Porro's operation, which is described and dismissed without discussion. This operation has now been reported sufficiently often to give its statistical history great value, and would seem to indicate a marked improvement in the surgery of obstetrics. Laparo-elytrotomy is quite fully and fairly presented.

In discussing face presentations and other abnormal conditions of the presenting head, no mention is made of the semi-rotation of the fœtus by the introduction of the hand into the uterus, until the palm is upon the abdomen of the child. This manipulative proceeding was first brought to our attention in a paper before the Massachusetts Medical Society, by the late Dr. Garland, of Lawrence, although its advocacy has since been mentioned by some of the German authorities. Dr. Garland, after a wide experience, claimed that this method was not only comparatively safe in careful hands, but that, in prolapse of the cord, the child could be rolled over and over, until the cord becomes so much shortened that the forming of a loop is impossible. For many years we have considered this one of the most important contributions to the obstetric art, and have made it of avail with the greatest satisfaction.

In a review, necessarily brief, several chapters of equal interest must be omitted. Although, without being hypercritical, we have reasonably expected much more of good incorporated in his book, we think we are entitled to offer our congratulations to Dr. Meadows and his readers upon the value of many of its exceptional merits. The author discusses, with great fairness, in a spirit of true learning, the tidal changes of opinion in a very important branch of medicine with clearness of style and accuracy of description.

HENRY O. MARCY.

WILLIAMS ON THE EYE.[1]

Dr. Williams has long been recognized as a most interesting writer upon a branch of surgery in which he is a master. He is well known as the author of a hand-book upon the Diseases of the Eye, which has passed through several editions. The book now published is not a revised edition of this, but a newly written work. In a very clear manner the more recent advances in this special field are given in a most agreeable style. The intention of the author has not been to treat the subject exhaustively for the professional ophthalmologist, but to furnish the general student and busy practitioner a correct knowledge of the diseases of the eye and their most approved modes of treatment. A thorough mastery of the normal conditions of the eye is emphasized as of the first importance. The variations of the optical functions of refraction and accommodation are clearly explained, the use of the ophthalmoscope and modern methods of exploration are taught, while in large measure formulated theories and elaborate details have been avoided. Test-types and letters are added and their uses explained.

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[1] The Diagnosis and Treatment of the Diseases of the Eye. By Henry W. Williams, A.M., M.D., Professor of Ophthalmology in Harvard University. Houghton, Mifflin & Co., Boston, 1881.

The illustrations are numerous and well chosen ; those of the ophthalmoscopic appearences selected as typical are exceptional specimens of color printing, and are not only of value for the lesson taught, but as examples of the art.

HENRY O. MARCY.

THE PROGNOSIS AND TREATMENT OF ANKLE-JOINT DISEASE.[1]

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IN a previous lecture[2] I called your attention to two important conditions of the ankle-joint—viz.: chronic synovitis and chronic osteitis. Before beginning the consideration of treatment I will briefly call your attention to the prognosis of these lesions.

All joint diseases, and especially those under consideration, require the element of time in their treatment. They are well calculated to test the patience, the industry, the ingenuity, and the temper of the surgeon. In many instances the symptoms will be so unimportant in the minds of the parents, if the patient be a child, or in the consideration of the patient himself, if he be an adult, that complete relief will be looked for in a very short time. But do not let the apparently unimportant symptoms mislead you. You may make it a rule to give an unfavorable prognosis in point of time, in certain chronic joint conditions, if the initial symptoms are apparently unimportant. In other words, the nearer the disease approximates an acute inflammation the better is the prognosis. The more insidious the onset, the longer, as a rule, the disease will continue, and the more uncertain are we regarding the duration, the course, and the ultimate result. Do not attempt, therefore, to give a prognosis until you have duly weighed each symptom, and carefully studied each phase and feature of the history. I have sometimes been tempted to class chronic joint disease as one of the self-limiting lesions. Many of its clinical and pathological aspects lead to the conclusions so ably stated by Dr. Flint regarding phthisis.[1] In other words, all that we can do in certain cases of chronic joint-disease is to watch, support and protect just as we do in certain acute diseases; only in many acute lesions the course of the disease is known, and in chronic joint lesions it is not known. Hence, I am very cautious in giving a prognosis in any chronic joint trouble. It is too much like guess-work; and he who guesses in orthopædic surgery will come to grief. It is my plan, to speak frankly to the patient or his friends, and to state plainly both the character of the lesion and the disadvantages under which the surgeon labors. My prognosis, therefore, is rather a description of the nature of the treatment and of the care necessary to obtain a good result. I do not believe that anyone is justified in making an exact prognosis in chronic joint disease. I do believe, however, that, unless the case is a very bad one a good result may be assured in childhood; and this is especially true of ankle-joint disease. But you must appreciate the effort necessary to secure this good result. I can not speak any more definitely than this. Nor can I speak with any greater certainty until there is some more satisfactory method devised for dealing with the known pathological conditions to which I have called your attention. When we can successfully transform a chronic regressive metamorphosis into an acute reparative lesion we can make a much more favorable prognosis. But we can not accomplish this transformation in all cases; indeed, with our present knowledge, we can succeed in only a very few.

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[1] A lecture delivered at the New York Orthopædic Dispensary and Hospital, November 10, 1881.

[2] The pathology, symptoms and diagnosis of Ankle-Joint Disease. ANNALS OF ANATOMY AND SURGERY, vol. v., p. 1, January 1882.

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[1] See "Self Limitation in Cases of Phthisis." By Austin Flint, M.D., *Archives of Medicine*, vol. i., No. 3.

Some surgeons seem to be afraid of producing anchylosis by immobilizing a joint in a state of chronic inflammation. I wish we could accomplish this end by so simple a procedure; but, anchylosis, in chronic arthritis, is not so easily produced. You may stiffen a joint more or less in a state of chronic inflammation, by an immobilizing apparatus, but you will very rarely produce anchylosis by this means. The disease has progressed, and it will progress in certain cases, notwithstanding every effort we may make. It would be a great victory for orthopædic surgery, could some procedure be devised, short of excision of the diseased articular ends, which would produce anchylosis or synostosis when necessary. In the acute joint lesions it is a very different matter. I have seen them rapidly anchylose under immobilization. And I may say that, as a rule, the effort of the surgeon in certain acute joint lesions is to *prevent* anchylosis. On the other hand, in certain forms of chronic articular disease, it is almost impossible to produce this result. In the latter case the condition does not attain a point where repair takes place until, in many instances, the epiphyseal structures are destroyed. The conditions met with are so perplexing and so little understood, and the indications are, apparently, so contradictory in some cases that it is not a matter of surprise that almost every surgeon should deem his own method of treatment the best, when, in reality, all are more or less faulty. We will try to-day to meet the indications as nearly as may be, simply saying that no treatment yet devised meets all the indications that the pathological conditions present.

If we find a distended capsule at the ankle-joint filled with fungous proliferating masses, the first question to be answered is: Does the disease involve the bone? For we should at once recognize the fact that however painless the lesion may be, however slight the inconvenience it occasions, the process is inherently destructive and progressive. Should we decide that the bone is free from disease or only slightly involved, we must at first make every effort to prevent a further progress of the proliferating fungoid masses.

Bear in mind also, that there are various pathological states in that condition which, for brevity and convenience, I have classed under the general heading of chronic osteitis. Those most frequently met with are:

1. OSTEITIS FUNGOSA OR GRANULOSA, either primary, i.e., occurring in the epiphyseal structures, or secondary, as a sequence of a fungous degeneration of the synovial tissue.

2. CARIES NECROTICA, a condition in which, the process of destruction is rapid, and carious bone is discharged, sometimes in quite large pieces.

3. SIMPLE SUPERFICIAL CARIES, following perostitis, and finally—

4. CARIES INTERNA CASEOSA. The prognosis varies somewhat in all these conditions, as well as the treatment. I have spoken of the prognosis in caries fungosa, and I stop again to impress upon your minds that it is a very sluggish condition, with very insidious prodromata. It is accompanied sometimes by the atonic form of suppuration. You do not get laudable pus in this form of abscess. The discharge is profuse, but thin and ichorous and filled with broken down tissue. In the necrotic caries the prognosis is more favorable; nature rapidly exfoliates the diseased bone, and the process is more like that which occurs in necrosis of the diaphyses of the long bones. In these cases, too, you will find more marked constitutional disturbance. The pro-

cess, in other words, more nearly approaches the acute form of disease, and it runs a much shorter course, recovery, with anchylosis, in many instances, taking place. The superficial caries, properly recognized and treated, may also be called a favorable lesion, for it may not involve the articular surfaces. It may, however, become the caries necrotica and total joint destruction may ensue. Suppuration of the more favorable type frequently accompanies this process, and the rule should be to open as early as possible, contrary to my usual custom. The caries interna caseosa, is a form very difficult to recognize, especially in the early stage, and it is very apt, with caries fungosa, to be called tuberculosis of the joint. I do not believe, however, that it is possible to differentiate, clinically, between these two conditions. These two, the fungous or dry caries and the caseous caries, are forms of disease that will principally engage our attention to-day. The other forms of disease are those which are more readily recognized and more easily treated, and I will not attempt to discuss them in detail to-day. Nor can I attempt to describe all the chronic joint conditions which we may meet with. Neither can I discuss the various theories regarding their tubercular or non-tubercular origin. I shall rather strive to impress some facts upon your mind regarding the most neglected and I think the least understood of these lesions.

But there are these forms of chronic osteitis of the joints to which I have so briefly alluded; and, while in many instances the differential diagnosis is very difficult, especially in the early stage, you may be assured, that the treatment to which I am about to call your attention will answer an excellent purpose in all the pathological states mentioned, whether you supplement your mechanical and systemic aids by incision, excision, etc., or merely pursue the method known as the "expectant plan."

There are many points concerning the etiology, pathology, symptoms and prognosis of chronic joint disease, that I should like to call to your attention before proceeding to the consideration of the treatment of ankle-joint disease; but it would be impossible to do the subject justice in one or even several lectures. We have yet to consider knee, hip and spinal diseases, before we close the discussion of these subjects, and you must pardon me if I defer some questions, and more especially those which are particularly suggested by other joint lesions, to a later date.

I showed you, upon the occasion of my previous lecture, two cases of ankle-joint disease. One of them illustrated the clinical aspects of chronic synovitis, the other of chronic osteitis. In the former we found the joint motions, nearly normal; a bulging of the joint capsule, an elastic feeling very suggestive of fluctuation, and an unimpaired walk and attitude. The other presented very different symptoms. The joint motions were very materially impaired by a very pronounced reflex muscular spasm; indeed, anchylosis was simulated by this peculiar condition. The joint outline was not obliterated, and there was no synovial bulging. The patient walked on his heel and limped very markedly; there was also a history of disturbed sleep. A difference in the condition of the muscles was also found in these two cases. The patients with chronic synovitis presented a well-rounded calf, matching its fellow, while the one with chronic osteitis showed a smaller calf when compared with its mate. The former had neither reflex muscular spasm, nor a localized muscular atrophy, the latter illustrated both of these conditions. I cite these cases again, and once more call your attention to them; because we shall make them the basis of our remarks upon treatment, and shall have made for them apparatus to be applied in your presence during the present course.

But, before we speak of mechanical treatment, let us stop for a moment and discuss constitutional treatment.

There are certain indications which must be plain to all who have studied these cases, but it is very important that we should recognize that we have a regressive lesion—a retrograde rather than a reparative process—to deal with. We will suppose it to be the fungous synovitis or caries, and in all cases, not otherwise specified, we will refer to these conditions in our remarks. What remedy or remedies are there which will act specifically upon this fungoid degeneration. We must answer frankly that there are none. Our very ignorance upon this subject drives us at once to the ground of all truly conservative surgeons—viz.: that of thorough, systemic treatment. We must make every effort to restore to nature its impaired reparative power; to bring to the local expression of a peculiar and little understood diathesis a greater plastic effort. But here again we are met by a state of affairs that requires much thought and study. Hygiene, exercise, diet, and many other things are to be thought of; but I know of no specific that I can recommend to you as applicable to all cases, or even one class of cases. Each case is a study, from the hereditary tendencies to the local condition of the joint, and it will require much thought, much study, much experience and observation to apply the remedies best adapted to a case of chronic joint disease. But do not neglect constitutional treatment, though you find that your pet remedy does not produce the impression it should; and, on the other hand, do not depend upon local or mechanical treatment alone.

Some cases are so very discouraging that you may almost be forced to admit, as I have done, that but little could be accomplished by constitutional aid, and that the disease was one which would run its course in spite of all treatment, and get well with a certain amount of joint destruction when the period of limitation was reached, or die in the effort. For in some instances, in spite of all you can do, the apparently simple chronic synovitis will progress and become, in addition, a chronic osteitis. Suppuration of the atonic form may follow, and lardaceous degeneration or tubercular meningitis may remove your patient. These very rarely follow in ankle-joint disease; the hip and spine are most likely to be complicated by these conditions. But one should always take them into account. All this may be very discouraging, I know, but we can only learn by looking at things as they are, not by discussing them from a fictitious standpoint. I have seen chronic joint disease recover with remarkable rapidity, so much so that in some cases I have doubted the correctness of my own diagnosis; but I know that we can, in the majority of instances, help nature very much, and by simply removing traumatism and by aiding nature, as indicated, we can secure the most excellent results, and render our patients, while under treatment, active and happy members of society—a condition of affairs not attained by those who ignore the benefits and curative influence of scientifically constructed apparatus.

The secret of successfully treating chronic joint disease, however, lies in its early recognition. Learn, therefore, to recognize these insidious lesions before great damage is done; not only that, teach the mothers and nurses, that they may know, that many of the slight limps attributed to a tight shoe, or to habit, etc., mean something serious. Teach your families that many cases of "worms" and "indigestion" etc., have turned out to be humpback. Tell the mothers of the families you are called upon to attend that a swelled joint may be the commencement of a serious disease; and thus aid in the diffusion of knowledge, which, if properly interpreted, will save more children from deformity and lameness than all the apparatus ever devised for their relief.

The synovial membrane contains absorbents; it has a limited neural distribution, and its vascular supply is good. After the lesion of chronic synovitis has existed for some time, however, its absorbent power is greatly interfered with. In simple hydrarthrosis, where there are unimportant changes in the synovial secretion, the absorbents still act, and one of our greatest hopes in the treatment of chronic synovitis is that the free surface of the membrane is not disintegrated by the fungous masses. Upon this basis, in certain cases, we make use of compression. For this purpose we use a silk, elastic anklet, compressed sponge or a firmly-applied flannel bandage, which latter should be frequently readjusted. We also use such remedies externally as may excite the absorbents, if there be any left, to greater action. Oleate of mercury, iodine, etc., are useful; so are blisters and friction by the hands. A gentle, but persistent surface massage seems to possess the power of assisting in exciting the absorbents. If the joint shows a higher temperature than normal, avoid the use of excitants and apply ice or other cooling applications, continued, if necessary, for a long time. Other remedies, such as the actual cautery, etc., suggest themselves; but they will occur to you as you study your cases, and read, if necessary, the authors whose contributions are so excellent. Study your entire armamentarium of internal remedies, and do not confine yourself for a long time to any one remedy. Iron, the hypophosphites, the various iodides, mercury, etc., etc., are indicatad, depending on the actual condition, the hereditary influences and tendencies. I have known mercury and iodide of potassium to accomplish excellent and rapid cures in cases with a syphilitic taint. I have known it to fail in many other cases. Iron is almost always indicated and a favorite prescription of mine is the plain tinct. ferri chlor., in large doses, combined with an equal quantity of glycerine. It seems in many cases to aid the plastic power, more than any other preparation I have used. But I might add a long list of preparations with which you are familiar. I will again state, before commencing the subject of mechanical treatment, that each case is a study in itself, and that you must determine, by experiment if necessary, the remedy or remedies necessary to aid you in the all-important element of mechanical support.

Whatever value traumatism may have as the *cause* of chronic joint disease, such as we have been speaking of to-day, there can scarcely be anyone who doubts its relation to the progress of the lesion, when once it is established. It is, at least, my firm opinion, that when a joint or any of its essential structures become diseased, we should adopt means which will, without doubt, remove the element of constant traumatism, produced by locomotion, etc., and which will protect the vulnerable tissues under all circumstances. This support, at the same time, should not materially interfere with exercise and locomotion. How shall we apply this general principle to the conditions we have been studying to-day? Nature rarely presents a pathological condition without, at the same time suggesting, if not a remedy, indications for its use. We learn from the pathological state and a study of the clinical features, how to apply the means of relief. Let me recall what we have said about *chronic synovitis* and see what it suggests.

In chronic synovitis there is almost normal use of the joint, with the fatigue after exercise. We should not, therefore, immobilize, for nature does not make the attempt. We should meet the indication, fatigue after exercise, and apply an apparatus which gives absolute joint protection.[1]

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[1] See "The Mechanical Treatment of Synovitis of the Knee-Joint." By C. Fayette Taylor, M.D. *N. Y. Medical Journal*, July, 1873.

In other words, when the patient is sitting there need be nothing but protection against accidental traumatism ; but when the patient walks this protection must be absolute, and the means by which it is to be obtained *should act promptly and without the exercise of volition on the part of the patient.* These, in brief, are the indications for the mechanical treatment of chronic synovitis of the ankle-joint.

Bear in mind, for it is very important, that you should always arrange your mechanical aids in treatment of chronic joint disease so that it shall *always act independently of the patient's will.* Make your protecting instrument, practically, part of the patient and part of the affected joint and limb ; adjust it so that the patient can not move or step without making the support available ; apply it so that whether sitting or standing, running or walking, whether the danger comes from the patient's own indiscretion or from some accidental cause, the joint—the vulnerable point—is always protected. I have seen so many inefficient methods adopted for these cases, so many truly useless procedures, that I feel that I cannot speak too strongly upon this point. It is true that anything which gives partial support may produce temporary relief ; but, when the patient feels this relief, he at once gives the affected joint more liberty, and, being not fully, or so to speak, not automatically protected, a speedy relapse ensues. Do not *seem* to do your work in orthopædic surgery, but always be sure that you accomplish all that is required when you use a support. Devise or prescribe the instrument yourself, and see that it is so constructed and applied that the principle involved is carried out. Of course, you must rely somewhat upon the discretion of the patient or his nurse ; but you can, by study and effort, so construct and so apply your supports that their use may be reduced to the adherence to a few simple rules, and you can soon tell whether or not these rules are obeyed. If they are not

I would candidly advise you to dismiss the patient, and devote your time to some other and more profitable employment.

Mechanical aids are essential to the scientific treatment of chronic joint disease. They will prevent deformity in many cases if they can do nothing more. In others, they will, where anchylosis is inevitable, permit you to elect the ultimate position of the joint. And you should always have at hand the facilities for adapting the instrument to the indications, and for making the instrument actually do the work required of it. You should master thoroughly the detail; you should always know more than the instrument maker, not necessarily about the manufacture of the apparatus, but about all other points. You should no more go to an instrument maker for advice than you would to a druggist for instruction. You should not send a patient to an instrument maker for treatment, any more than you would recommend a patient for treatment to a pharmacist. You should prescribe your instrument upon a rational basis, just as you would prescribe for an acute disease; and you should be able to tell the instrument maker, if the instrument is faulty, where the fault lies, or, better still, you should be able to correct the fault yourself. Upon this basis I know of no more satisfactory or pleasant work than orthopædic surgery. But, under any other conditions, it is the most unsatisfactory kind of work. The profession must sooner or later appreciate this, and when they do, orthopædic surgery will be properly understood and appreciated, and that kind of talent will be attracted to it which will make its future brilliant. For there is more to be learned, I feel, in orthopædic surgery than in any other branch of surgery; and hence, there is more to be gained by those who diligently follow it, and intelligently study its problems.

To revert more particularly to chronic synovitis again, I said, and I again repeat it, do not immobilize the joint in *chronic synovitis.* If you do, the joint soon becomes stiff and useless, and the closely observing friends of the patient will inform you—and they will state a fact—that the joint is in a worse condition than before you applied the apparatus. Use of the joint in chronic synovial inflammation, therefore, is indicated. Motion, without pressure, is plainly demanded; in other words, we must *avoid traumatic contact of the vulnerable surfaces.* To accomplish this we must produce a certain amount of traction, but we must not prevent free movement.

There are no muscular contractions to overcome; there is no deformity of the joint to remove; there is no pain caused by interarticular pressure in chronic synovitis. The idea should be to produce just enough traction upon the joint to transfer the weight of the body to some other point, giving the joint full liberty when the pressure caused by the weight of the body is not present. Clinical experience teaches, in ankle-joint synovitis, that if we apply an apparatus that just prevents the foot from touching the floor when the patient walks, we place the joint in the best possible local condition for repair.

I may say here that I have been disappointed with all instruments that I have seen, that have been devised for the treatment of ankle-joint disease, whether synovial or osseous, that act upon the ankle-joint alone. In order to perfectly protect the ankle-joint we must limit more or less the movements of the knee-joint. If we wish to immobilize the ankle-joint in locomotion we must also control the knee. This fact we can, in some cases of synovial disease, ignore; but in the vast majority of cases we cannot ignore it; and hence, we must include the knee-joint in our support. But where shall we obtain our counter support? If we are going to actually protect the ankle we must not depend on adhesive plaster and its attachment to the skin for our counter support. This is one of the fallacies that I have tried to combat. Adhesive plaster forms a very excellent and, indeed, the best means of applying direct traction to a distal part of the body, where we have a fixed point to pull against, as in hip disease or knee disease, or even in ankle disease, if we apply our adhesive plaster to the parts beyond the ankle-joint. We cannot make a reliable fixed point with adhesive plaster. We must go to the perineum for our fixed point, to the tuber ischii, just as we do in hip disease; and we must make our support so that we can control the knee-joint if necessary, and actually support, protect or apply traction to the ankle-joint as indicated. In chronic synovitis of the ankle-joint, and in chronic osteitis, also in some cases we can allow the patient to bend the knee when he sits down. As I will show you, there is a peculiar arrangement at the hip and knee in the apparatus I use, by which the patient can flex the knee-joint and the hip-joint as he sits down, and this mechanism locks automatically in the straight position when the patient stands erect or walks.

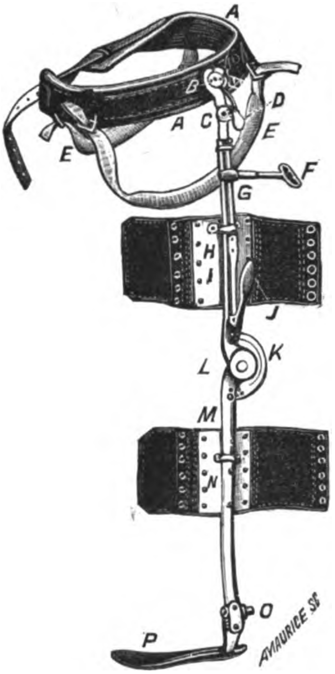

FIG. I. SPLINT FOR THE TREATMENT OF ANKLE-JOINT DISEASE.

Here, gentlemen, is the instrument I use in ankle-joint disease; it looks formidable when removed from the patient, but when adjusted properly it is one of the most comfortable and efficient I have ever used. It is composed of six essential parts: (1) The pelvic band *A B*, which enables us to make the fixed perineal point of support *E E*. (2) The automatic hip-joint movement *C* which admits of flexion when the patient sits down, and which locks without aid when he stands. (3) The thigh part *G* in which we place the extension rod. To this thigh-piece we attach a plate *H* for loose lateral attachment to the thigh. (4) The knee-joint, with its automatic "snap" *J*, which always locks when the patient stands up and commences to walk. (5) The calf part *N* which, like the thigh-piece, has a band and leather lacing to afford lateral attachment. (6) The ankle-joint *O*, with a worm and screw, which enables us to place the foot-piece *P* in any desirable antero-posterior position (see Fig. 1).

This instrument is modified from one introduced by Dr. Taylor, for chronic synovitis of the knee-joint. Dr. Taylor's instrument is pictured in his article on "The Mechanical Treatment of Synovitis of the Knee-Joint," already referred to. To it I have added the extension rod *C*, and the pelvic band *B*, the automatic joint at the hip *C*, and the worm and screw, controlled by a key at the ankle *O*. The joints at the hip and knee permit the patient to sit in an easy position, and when the patient stands they each lock automatically, and form a continuous splint. Protection, with traction, if desired, is thus always secured when the patient sits, and traction is always present when the patient walks or stands.

The instrument is well adapted, in a mechanical sense, to the treatment of either chronic synovitis or chronic osteitis of the ankle-joint. The modifications necessary to meet the indications in these two conditions are made at the ankle-joint. For chronic synovitis we find just how much motion the patient should have, and then, by a "catch" in the sidepiece of the foot-plate (this is not shown in the plates) we limit the flexion and extension of the foot. We then apply the instrument,. and generally without any adhesive plaster whatever. The instrument fits the contour of the limb, and we adjust it so that the foot-plate comes closely in contact with the sole of the foot, before the shoe is applied, and with the pelvic band just below the anterior superior spine of the ilium. Then lace the calf piece *first*; then apply the shoe *over the foot piece*. You will be surprised, if you make the instrument fit, how easily the ordinary shoe goes over this foot-piece. Then lace the shoe quite snugly; then lace the thigh-piece; finally buckle the pelvic band, and secure the perineal pads. Now make gentle traction, with the key just enough to carry the foot-piece, enclosed by the shoe, slightly away from the sole of the foot. Place the patient on his feet. Almost the entire weight of the body falls on the tubera ischii when the affected ankle-joint is used in locomotion. The knee-joint is stiff, or not as you would wish, for, by removing a couple of screws, the automatic spring can be taken off. The ankle is protected against all ordinary traumatic influences, and the apparatus is almost as much a part of the

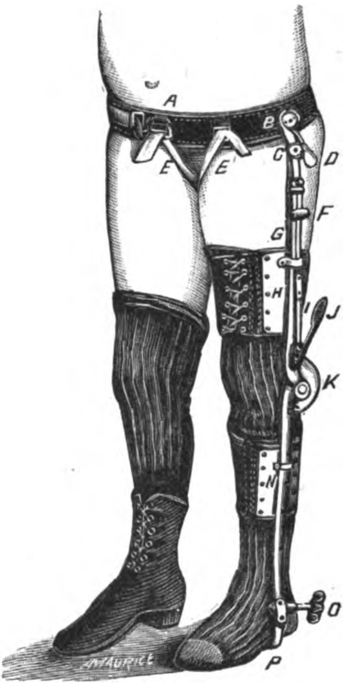

FIG. 2. SPLINT APPLIED IN THE TREATMENT OF ANKLE-JOINT DISEASE.

patient as though he had been born with it. Whatever the patient does, the support is constantly acting, and no voluntary effort is needed to protect the inflamed joint surfaces. The risk of traumatism is reduced to a minimum, and you can now satisfactorily commence your systemic treatment. You can always control the amount of motion at the ankle-joint; and at night, if you wish to protect your patient against accidental traumatism keep the instrument on and apply a bandage in place of the shoe, or adjust some simple form of ankle-joint splint. You ought to insist that the patient should never walk without the support; for if you permit any discretion in the matter, you might as well have no rules at all. If you say that the patient can walk without the support occasionally in the treatment of chronic synovitis, he will sooner or later make it his habit to reverse your rule, and wear the support occasionally. In chronic osteitis, however, there is very little necessity for this rule. The comfort afforded by the apparatus so far exceeds the discomfort occasioned by its use that the patient will much prefer to wear the support.

In using this instrument for chronic osteitis of the ankle, you not only have a different pathological state from that found in chronic synovitis, but you must also make the modification necessary to meet it. You have no malposition of the joint in chronic synovitis, and hence, you can use the apparatus with more or less antero-posterior movement at the ankle. But in chronic osteitis we find reflex muscular spasm, malposition, either antero-posterior or lateral, pain and much greater difficulty in locomotion. Still, exercise in the open air is indicated, and joint protection is much more urgently demanded. How shall we make this instrument meet the indications?

Let me say here, for your future guidance, in the treatment of chronic articular osteitis, that you should always adapt your apparatus *exactly* to the deformity, whatever it may be, and that you must, by gradual and very gentle changes, restore the joint to the normal position, or that position, whatever it may be, which you seek. For ankle-joint osteitis I have introduced an antero-posterior worm and screw (*O*, Figs. 1 and 2). We can then, by a key, turn the foot-plate into a position of equinus or calcaneus, and so adapt it to the deformity; for there is no lateral malposition of the ankle-joint itself, and we can bend the side-bar to meet the secondary tarsal malpositions. After we have adapted the foot-piece and the side-bar to the actual deformity, we go through the same process as that just now described—viz.: We lace the calf-piece first, then adjust the shoe, then lace the thigh-piece, and lastly, arrange the pelvic band and perineal pads. We can reenforce this laced shoe with adhesive plaster, if necessary, however, and then make very thorough traction, applying considerable force, and in this way producing that peculiar avoidance of injurious contact which is so grateful to sufferers from chronic osteitis of the joints.

Patients who could not walk before the support is applied will generally walk well after this apparatus is properly adjusted, without any further aid. They do not need crutches or cane. It is only necessary to make the sound limb artificially longer with a high-soled shoe, and advise care in locomotion at first. You do not have to urge these patients to walk; they soon become very active—as active, indeed, as children without joint disease.

Gradually you will change the position of the foot-plate, and the foot will follow it. In a few days you will see the ankle-joint in a good position, and the progress toward recovery fairly commenced. The instrument, as adjusted but without the shoe or traction, is shown in Fig. 2.

Before giving you some practical demonstrations. I will briefly refer to some other matters: 1st, regarding abscesses: their presence does not interfere with the use of this support. Bad cases, with œdematous infiltration, sometimes improve very rapidly under its use, and you can very easily arrange the support so that it will not produce any discomfort. 2d. If pain be very severe it is advisable to apply adhesive plaster, and to keep the patient in bed, where the proper local treatment can be carried out. 3d. Give a few *positive* rules for the guidance of your patient, and insist upon their being obeyed.

The question of operative interference, excision, etc., is applicable to other joints as well as to the ankle, and I will consider these and other matters upon some subsequent occasion. I may say, however, that I have seen very few cases of ankle-joint disease where I deemed excision or amputation justifiable in a child.

PLASTIC SPLINTS IN SURGERY (CONTINUED)[1]

BY SAMUEL N. NELSON, M.D.,
OF BOSTON, MASS.

SPECIAL APPLICATIONS.

MY limits will not permit me to mention the application of plaster of Paris to the various forms, for which the reader is referred to the more extended works of Dr. S. B. St. John and others. I wish, however, to call attention to its use in one or two varieties of fracture:

There is much discussion in regard to the best treatment of fracture of the femur. At the meeting of the American Medical Association, in 1876, this question was considered by able men without arriving at any definite conclusion; some advocating extension by weight and pulley as being all that is desirable; others being in favor of suspension, in addition to extension; and yet others, claiming the best results from the plaster of Paris splint.

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[1] An inaugural thesis presented to the Faculty of the Medical Department of the Harvard University, June, 1881.

We append some results of treatment of fractured femur, as reported by men whose names are a guarantee for accuracy, and whose combined evidence must have much weight in favor of the plastic splint:

Prof. H. B. Sands, in the *New York Medical Journal* for 1871, reports twenty-one cases, seven of which were under 15 years of age. In two of these there was no shortening; in the rest the shortening averaged one-fifth inch, and the minimum was three-fourth inch. The remaining fourteen were over 15 years old, and there was no shortening in six. The average shortening was one-third inch, and the maximum was one inch.

Dr. Bryant reports, in the *Medical Record* for September 15th, 1871, twenty-three cases, with no shortening in thirteen, and ten with an average of one-fifth inch.

Dr. Sayre, in his Report on Fractures before the American Medical Association, in 1874, reports thirty-two cases, with no shortening in four, with a maximum of two inches, and one ununited. The three cases of greatest shortening were necessarily confined to the bed for other complications.

Dr. St. John reports, in the *Louisville Medical News* for September 28, 1878, a series of 156 cases as follows: "To recapitulate, we find, in the Bellevue Hospital, one hundred and thirteen cases with an average shortening less than one-half inch; in Roosevelt Hospital thirteen cases, with an average shortening less than five-eighths inch; in St. Luke's Hospital three cases, with an average shortening less than five-eighths inch; in Chambers Street Hospital fifteen cases, with an average shortening of less than one-fourth inch; other sources twelve cases, with an average shortening of less than one-fourth inch; or a total of 156 cases, with an average shortening of less than one-half inch."

Dr. Marcy recommends, as the best treatment for fractured patella, that the fragments be wired, and the whole kept in place by a plaster bandage. We find no reports of cases of the application of plaster to fractured clavicle, but it is recommended by Drs. St. John, Stephen Smith and Marcy. Over a layer of wadding, cover the chest with a light bandage; leave the arms free, but hold the shoulders well back, and thus secure fixation of the parts. In this way overlapping of fragments is prevented. The merit of the splint thus applied is, the patient has the free use of the arm of the affected side, and has less discomfort than by the more usual treatment.

So far as we can learn, the plaster dressing has been applied to fractured ribs in only a few cases, but in these with excellent success. A case each has been reported by Dr. St. John in 1871, by Dr. Sayre in 1874, by Dr. Cominger, of Indianapolis, in 1877, by Dr. Green, of Elizabeth, N. J., in 1877, and I take pleasure in reporting a fifth in which I assisted Dr. Marcy, 1881, who has for years treated this fracture with plaster of Paris only.

Mr. P. fell from staging, breaking sixth and seventh ribs on right side. He was seen on the third day and a plaster splint applied. He was able to be about, and, in three weeks, was discharged cured. Two advantages are thus attained; there is more vertical stiffness than in the adhesive plaster, and the plaster dressing, by being moulded into the intercostal spaces, prevents motion of the fragments under the spasmodic action of the bruised and irritated muscles.

For fracture of the spine the plaster of Paris jacket seems to be about the only effectual treatment, and if the patient is seen sufficiently early, and the cord escape serious injury, good results may be expected. The dislocation should be reduced by suspension, and a Sayre's jacket applied, sufficiently strong to keep the parts in normal position. With such a jacket the patient lies comfortably in bed.

Dr. James K. Wood has treated one case of fracture of the cervical vertebræ, causing complete paralysis, with plaster, and perfect recovery resulted. I have assisted in so treating a case of fracture of the fourth dorsal vertebra with complete paralysis, where autopsy showed serious lesion of the cord. Adaptation and retention of fragments were perfect, life was prolonged for three weeks, and there was some return of sensation.

Not only in simple fractures are the great advantage of plaster dressings seen; they are applied in compound fractures, in modified forms, with excellent results. This treatment of open fractures is advocated by Erichsen, Billroth, St. John, Hamilton and Marcy. I take great pleasure in referring, in this connection, to the very able article of Dr. Bryant, in the ANNALS OF ANATOMY AND SURGERY for October, 1881, where all the details of the application are stated.

The plaster splint is particularly useful in any case where absolute rest of the parts is required. A sprain of the ankle, for instance, where one of the lateral ligaments has been ruptured, or at least stretched—nothing is more philosophical than encasing it in a perfectly-fitting splint, giving it entire rest till the injury has been somewhat repaired. Its advantages in treating many cases of disease of the knee-joint are likewise evident.

Plaster of Paris is especially useful in cases of angular or lateral curvature of the spine, and "Sayre's plaster jacket" is now widely known. It affords a means by which rest is secured, not permitting motion so long as it is properly adjusted. The result is that consolidation takes place, and a cure ensues.

We arrive at the conclusion, then, that besides being of particular service in the treatment of other affections, the plaster of Paris immovable splint is the most rational device for fractures. With it better results are obtained, and the patient is assured of less discomfort while union is taking place, which ensues in a more rapid and certain manner. Any surgeon of unbiased mind, having made himself thoroughly familiar with minutiæ of detail—for upon this rests the secret of success—will prefer its use to any other. Comparatively new, as applied in the best and most satisfactory manner, the plaster splint deserves much more attention and confidence than it has hitherto received.

"REVERSION OF TYPE" IN THE DIGASTRIC MUSCLE OF THE HUMAN BEING.

By CHARLES A. TODD, M.D.,

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PROFESSOR OF ANATOMY, ETC., IN THE MISSOURI MEDICAL COLLEGE.

WHILE engaged, several years back, in dissecting the head of a boy aged about seven years, I found a condition of one of the large muscles attached to the lower jaw that I had never before observed, nor could I find any reference to such a condition in any works on human anatomy within my reach. The anomaly was this: the very important depressor muscle of the lower jaw, the digastricus, on the right side divided its anterior belly into two portions, one part being attached to the jaw as usual, the other passing across the median line to join its fellow upon the left. In the diagram, it will be observed that a bundle of these errant fibres makes an arch with the left anterior belly, while the rest pass onwards in the same general direction with the belly. In the diagram, the triangular space between these differently running fibres is represented as open; in fact, there was no such free space, the fibres being close together and held in position by connective tissue. An accurate drawing of the appearances was made from the dissected specimen.

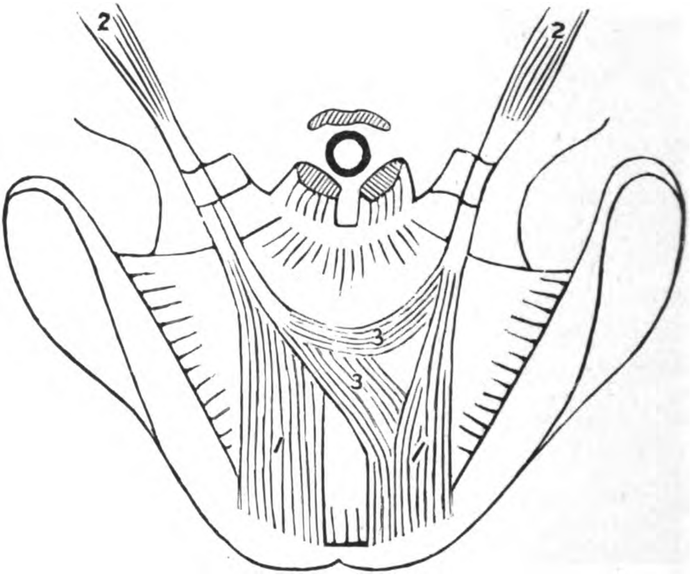


FIG. I. HUMAN LOWER JAW, UNDER SURFACE.

1. Anterior bellies, *musc. digastricus.* 2. Posterior bellies, *musc. digastricus.* 3. Abnormal arrangement of fibres of the anterior bellies.

Since making this discovery I have noted that in all the monkeys examined dying at the St. Louis Zoölogical Garden, the two anterior bellies of the digastricus (which otherwise resembles the normal human) form one continuous sheet of muscle, as shown in the diagram. In these animals, however, there is a tendinous arch continuous with the tendons of the two digastrics and crossing in front of the hyoid bone; from this arch the fibres of the anterior muscular mass take origin.

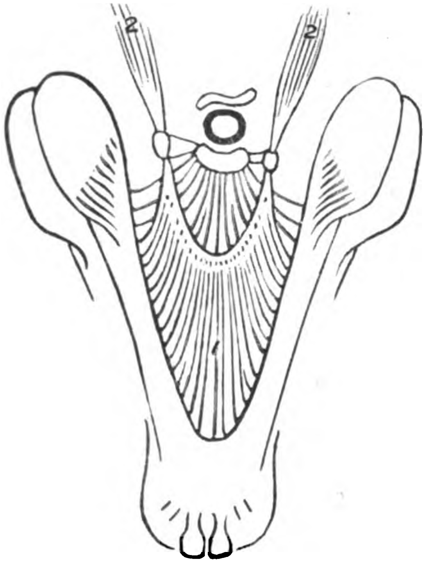


FIG. 2. MONKEYS LOWER JAW (NAT. SIZE), UNDER SURFACE.

1. Anterior mass of *musc digastricus*. 2. Posterior bellies of *musc.digastricus*.

The resemblance between this normal form of the digastricus in the monkey and the human abnormity recorded is most striking, and will be regarded by some Biologists as a good illustration of " reversion of type."

MUSCULAR ANOMALIES.

By R. L. REA, M.D.,
OF CHICAGO,
PROFESSOR OF ANATOMY IN THE CHICAGO MEDICAL COLLEGE.

THE following notes of muscular irregularities were furnished me by my Prosector, W. E. Morgan, and show an amount of abnormal deviation unprecedented in a very extensive experience. Varieties in arterial arrangement and unusual distributions are very common in both the arterial and nervous systems—the less in the latter. Muscles having a definite individual duty to perform admit of no such peculiarities, while for arterial or nervous supply it matters not whether a part is furnished by two, three or more trunks so the normal amount of blood and nervous influence is supplied to it. Some of these are very moderate deviations from normal, but indicate a general tendency to depart from the natural regular type. The subject was a female of medium size and build, and gave no external indications of the irregularities within :

1. A slender slip of muscular fibre from the zygomaticus minor extending horizontally inwards to join partly with the levator labii superioris proprius and partly with the musculus anomalus.

2. The trapezius extending only as far down as the tenth dorsal vertebra.

3. Two distinct and somewhat rounded bellies forming the levator anguli scapulæ.

4. A narrow muscle accompanying the sterno-hyoid from insertion to origin (i. e., from the hyoid bone to the ster-

num), here passing through a loop of deep fascia, then extending backward and outward, narrowing to a very slender tendon, which finally attached into the transverse ligament of the scapula just outside the attachment of the omohyoid.

5. The sternal and clavicular portions of the pectoralis major separated widely until approaching insertion, the interval being nearly an inch in width at the clavicle.

6. An additional muscular slip for the pectoralis minor, coming from the second rib.

7. The serratus magnus had no digitation from the first rib, but had two from the second, as usual, and two from the third.

8. The index portion of the flexor profundus digitorum formed an entirely distinct muscle.

9. No palmaris longus.

10. The third lumbricalis sent out two slips of insertion, one going to the middle and the other to the ring finger.

11. Seven palmar interossei, two for each finger, except the minimus which had one.

12. A third and narrow belly to the biceps femoris; rising from the base of the posterior margin of the trochanter major and inserted into the tendon of the long head about an inch above its angle with the short head.

13. The peroneus tertius arises from nearly two-thirds the anterior surface of the fibula.

14. The extensor proprius pollicis arises from three-fourths the surface of the fibula, and has an extra tendon which is inserted into the base of the first phalanx of the great toe.

15. No flexor brevis pollicis pedis, the abductor pollicis being nearly twice its usual size as a compensation.

16. Flexor brevis digitorum had but three tendons.

17. Only three lumbricales pedis.

ONE ARTERIAL AND TWO MUSCULAR ANOMALIES.

By JOHN JAMES BERRY, M. D.,
OF FALL RIVER, MASS.

THE following three anomalous conditions were noted during the dissection of *one* subject by Dr. C. C. Terry and myself. The first is of some surgical interest from its relations in the operation for ligature.

POSTERIOR TIBIAL ARTERY.—Normal on the right side. On the left side it emerges from under the posterior tibial nerve in the upper third of the leg, and passes along internal to the latter, as far as the junction of the middle with the upper third of the limb, where it makes a sharp turn and crosses over to the posterior side, and, becoming external to the nerve, diverges more and more from the latter as it descends to the plantar region. So that at the usual point of its ligation—between the malleolus and inner margin of the tendo-Achillis—it lies at an appreciable distance *behind* and *outside* the nerve.

LEVATOR ANGULI SCAPULÆ.—The origin and insertion of the muscle itself are normal, but from its middle portion and posterior margin is given off a narrow, muscular slip about one-third the diameter of the muscle, extending under a portion of the rhomboideus minor to be attached to the vertebral aponeurosis, where the inferior margin of the rhomboideus minor and the superior margin of the rhomboideus major are attached to the spine. This anomaly is bilateral. I have been unable to find in the works of Tillaux, Quain, Richet, Cruveilhier or Gray any reference to either of these two peculiarities.

SARTORIUS.—In addition to the above, another occasional condition which existed may be mentioned:

namely—the insertion of both sartorius muscles into the fascia on the inner side of the leg, without being in any way connected with the tibia.

NERVE STRETCHING IN LOCOMOTOR ATAXIA. ELONGATION OF BOTH SCIATICS. RECOVERY WITH MARKED IMPROVEMENT.

By JOHN A. WYETH, M.D.,
OF NEW YORK,
SURGEON TO THE MT. SINAI HOSPITAL.

N. W., æt. 53, admitted September 13, 1881. Family history negative, excepting that his father died with cerebral softening. The patient's life has been one of great exposure. He has long been a heavy drinker of whiskey; denies excessive venery. Twenty-five years ago received a blow on the upper spine, and thinks this the cause of his present trouble. Seven years ago first symptoms of locomotor ataxia began. Case seen by Dr. R. M. Cramer, who kindly referred him to me for operation. Recently patient has suffered excruciating pains in both legs. Was seen by Dr. Hammond in consultation, who confirmed the diagnosis and advised an operation, which was done under ether on September 17th, 1881. Both nerves were exposed at the junction of the middle and lower third of the thigh and were lifted on the finger. The right was stretched most vigorously, the leg being lifted from the table by the nerve looped over the finger. On the following day the pains had entirely ceased in the right leg, while those of the left leg were much less appreciable. Six months after the operation the improvement, as regards pain, continues. The patient thinks his locomotion is better, but I cannot see any improvement. The result, as far as the alleviation of great pain is concerned, is very gratifying.

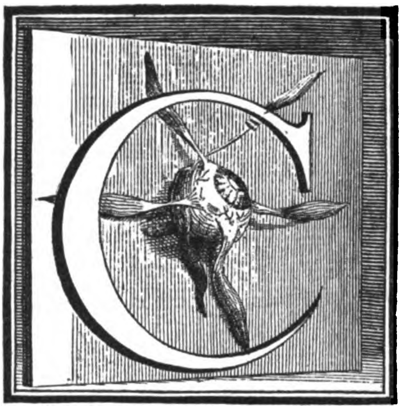
HISTORICAL AND BIBLIOGRAPHICAL NOTES.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M. D.

XVI.—AURELIUS CORNELIUS CELSUS.

B. C. 25—A. D. 40 (?).



CELSUS flourished at a period of very progressive activity in the development of the healing art. He gives us the names of a number of the most distinguished improvers, discoverers, and surgical authors, who were either his contemporaries or immediate predecessors. "Now this branch, though it be the most ancient, yet it was cultivated more by Hippocrates, the father of all medicine, than by his predecessors. Afterwards being separated from the other parts, it commenced to have its own distinct professors, and received considerable improvements in Egypt, as well as elsewhere, principally from Philoxenus, who had treated of surgery most carefully in several volumes. Gorgias also, and Sostratus, Heron, and the two Apollonii, and Ammonius Alexandrinus, and many other celebrated

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men, have each of them contributed by their researches in surgery. And at Rome also, professors of no mediocre ability, and particularly of late, Tryphon the father, and Euelpistus the son of Phleges, and Meges the most learned of them all, as it would appear from his writings, having changed some things for the better, have made considerable additions to this art."

Where now are the voluminous surgical contributions of Philoxenus, of Meges, and of the others to which Celsus refers? Not a fragment of these writings has survived the wreck of nearly a score of centuries.

It is impossible to over-estimate the value of the works of Celsus; works so rich in accurate delineations of disease, so replete with judicious observations, and so abounding in practical suggestions. By the aid of these precious treatises we are enabled to take a retrospective leap over the vast intervening gulf of time embraced in the entire Christian Era, to walk the streets of imperial Rome with this elegant scholar and experienced surgeon and witness the practice of the ancient masters of our art as it was in the days of the Emperors Augustus and Tiberius.

Is it not a profitable and also an exceedingly pleasant diversion to turn aside now and then from the labors and care of the present busy hour of life to contemplate the activities of the past, and glance over the long period of time, during which our present system of scientific knowledge has been slowly evolving? The reader must pardon my love and enthusiasm for the old masters of anatomy and surgery, and be gentle and patient with me as I carefully brush away the dust and mold from some of the antiquarian bibliographical treasures, and quote examples from their ample pages, and sing praises to the memory, the genius, and the worthy labors of the fathers of physic.

It will be remembered that the whole science and art of physic, previous to the epoch of Celsus, was divided into three parts. The professors of the first part, Diætice, endeavored to cure by diet, exclusive of medicine; the Pharmaceutice, by medicines, and the third, the Chirugice, by manual operations. Celsus was a conservative and treated of all these methods of cure, devoting nearly an equal amount of attention to each of them.

While every portion of his eight books abound in interest, and furnish us with a clear insight of ancient medical practice, I am free to admit that my admiration is especially excited by the chirurgical books, wherein we are informed of the variety, number and excellence of the practical methods, ingenious devices, and ample resources which were employed by the surgeons in the first century.

I will introduce a few examples of ancient surgery from the works of Celsus. He has written quite fully on the genito-urinary organs; circumcision; the use of the catheter; external urethrotomy for the extraction of calculi, vesical lithotomy, etc. In treating of drawing off the urine, he says: " For this purpose, then, brazen catheters are made; and that they may serve in all cases, both large and small, the surgeon should keep by him three for males and two for females. The largest male catheter should be fifteen fingers' breadth in length; the next, twelve; and the smallest, nine. The largest female catheter should be nine fingers' breadth in length; and the smallest, six. Now these ought to be slightly curved, but the male catheters, more particularly so, and very smooth, and neither too stout nor too slender."

Celsus gives admirable directions for the introduction of the catheter.

Such catheters have been found among the ruins of Pompeii, where they were entombed soon after the death of Celsus, along with uterine speculums and other surgical instruments, which are now to be seen in the Pompeian Museum in Naples.

When a stone becomes impacted in the urethra and cannot be extracted "with an ear-probe, or with the instrument with which they extract the stone in lithotomy," he directs that the prepuce be drawn forward and ligated, an incision made on a line with the urethra over the calculus, on the removal of which the integument being permitted to retract the opening is closed and the urine follows the natural channel, and thus a fistula is avoided. Is not this an example of consummate skill?

The Celsian operation for stone in the bladder, famous in the annals of surgery, is worthy of detailed account, and must therefore be reserved for a special chapter.

[To be Continued.]

EDITORIAL DEPARTMENT.

AMBIDEXTER.

There is a prevalent opinion among the laity that the surgeon should possess equal skill in both hands. From the etymology of the word,[1] that to the surgeon was assigned the department of the healing art requiring skilled handwork, it was but a single step to the opinion already expressed that, he who would attain the highest excellence must possess it equally in both hands. Nor is it difficult to understand that a department of medicine, which could lay no higher claims to merit than manual dexterity, should find its followers chiefly among the ignorant, and that a merited contempt for its shallow pretensions should exist in the minds of all real students of medicine. That such has indeed been, and, to some extent, still remains the case, is too well known to require proof, and it is a tacit acknowledgment that surgery no longer rests her claims upon trickery and deception that she is received in the front rank among the learned professions. That, however, which gave to surgery its name is no longer supreme, for, towering above it, and, in a measure, overshadowing it, are the glorious attainments upon which modern surgery rests her claims; and there is now some little danger lest a department certainly of great importance, though merely mechanical, should not receive the attention it so much deserves.

In regard to the attainment of the skill that is expressed in the heading, no one certainly can urge its necessity or importance. The operations are indeed few, and the instances extremely rare, in which, by a change of position, the right hand may not be employed to best advantage. Beside the skill of the right hand as *principal* is equalled by the skill of the left hand as *assistant*. Few indeed realize this! Few indeed note the consummate skill and tact that the left hand possesses as an assistant; and it may be said, with fairness and much truth, that he who would turn aside to train his left hand for the more important work would consume valuable time without prospect of commensurate returns. There are, however, circumstances in which a trained left hand can be used to great advantage, as the following examples will show :

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[1] Originally, Chirurgeon from *χειρ*, hand and *ἐργος*, work.

I was assisting a surgeon in a case of vesico-vaginal fistula. The rent was high up, but uncomplicated. Seizing the left lip of the rent with the forceps in his left hand, he made one continuous incision freshening the entire side. Then changing hands, he attempted to complete the operation in the most convenient way, but the hands had no skill, and he was obliged to replace the knife in the right hand and take the forceps in the left, *and then, by crossing his wrists and greatly obscuring his view,* he successfully completed the operation. *This occurred in the service of a surgeon who had taught anatomy and operative surgery for a third of a life time.* Soon after this, on a similar occasion, a surgeon of ten years' experience was holding a patient's leg with his right hand, when it became necessary for some one to cut a ligature. Seizing the scissors in his unoccupied left hand, he attempted to cut the thread and *failed,* and was compelled to change his arms to accomplish even so trifling a work as this. With these two failures before me as a text, I shall offer a few suggestions upon the education of the left hand. Those for whom I write are not the busy and experienced, but those who are just entering upon their labors, and who must spend years as assistants before they will be burdened with the responsibilities they now so much covet.

These, then, I wish to ask the single question, "How have you reached the degree of manual dexterity you now possess?" To answer this, a third of a life time must be reviewed. The first lessons of the nursery were to put the right hand foremost, and, from earliest childhood to opening manhood, the sports and avocations all called the right hand to the front. The toys, the hoop, the bat, the pen, pencil, blackboard, the drawing lesson, have all contributed to the strength and precision, as well as the delicacy and refinement of the right hand, so that whenever new work was undertaken the previous training made its mastery easy and speedy.

Were the training of the right hand solely to be accomplished upon the cadaver, or in operating, I would not say a word, but such is not the case. The right hand is a master-workman before the scalpel is ever taken in hand, and he who cares to train his left hand can do it at odd spells, when nothing else presents itself. If one will review the duties of a single day he will see how habit has placed the right hand foremost, even in the most trifling things, and always even in the most trifling thing compelled the left to stand back until wanted. In washing, combing the hair, dressing, etc., the right hand must do the work. Who has not been obliged to get assistance in dressing when a finger or thumb of the right hand had become disabled? Does a pencil require sharpening? We open the knife with the right hand and sharpen the pencil with the right hand. Is a nail to be drawn? a board to be sawn? a stick to be split? a button to be sewn? The work is consigned to the right hand. This is the school in which the right hand learns its skill and boldness; and in this school—a school that makes no charge for tuition, requires no expense of time, no unusual opportunities—the left hand can be put in training. A pine stick will serve to whittle, and, simple as this may seem, it will not be unattended with awkwardness in the first attempt. Upon a plain pine board let one attempt to carve his name, and he will see the lack of confidence with which he holds his knife, the uncertainty and waywardness of his strokes. Let him attempt to saw, and he will be surprised that even this is not an accomplishment to be despised, and his surprise will not end with the awkwardness of his left hand when he makes it principal. His right hand is just as awkward as an assistant. No one in sharpening a lead-pencil ever thinks of the degree of assistance rendered in the work by the left hand; and this he will not understand or appreciate until he attempts to sharpen one with his left hand and sees how awkward his right hand is as an assistant.

In the use of the scissors the first attempt usually is a failure. The importance of success is not deemed worth a second attempt. How many are acquainted with the mechanical fact that all scissors are made right-handed, and that a corresponding motion of the left hand will unfit the best pair of scissors for work. In the customary use of scissors we, by force of habit that has become second nature, so use them as to tighten the rivet, which brings the cutting edges as near as possible into line. In other words, we push with the thumb and draw with the fingers when we use the scissors in the right hand. In the use of the left hand we instinctively employ the same manœuvre, but not with like success, for the scissors are *right-handed*, and to use them in the left hand the *thumb* must draw and the fingers push. Hardly a day goes by in which the scissors, lying on one's table, are not brought into requisition ; and he who will cut scraps and bits of string with his left hand when occasion arises, will soon be surprised at his skill when such skill is really necessary.

Among the various gymnastic exercises for the left hand a most excellent one is that of the crayon and blackboard. To make a bold, clear, straight stroke without breaking the crayon, to make fine parallel shading lines, to make curves and circles, are not merely valuable to train the eye, but are of great value in educating the hand to light but steady and gentle manœuvres.

OSCAR H. ALLIS.

AN ENCYCLOPÆDIA OF SURGERY.[1]

The first volume of the System of Surgery announced as to be published by William Wood & Co., of New York, under the editorship of Professor John Ashurst, Jr., of Philadelphia, and with the style of "The International Encyclopædia of Surgery," is before the profession for its judgment. The publisher's original announcements declare that this work is to be "the most complete, the most thorough, the most practical, and withal the most authoritative treatise on surgery extant;" "a complete library in itself upon the science and art of surgery;" "the most valuable addition to surgical literature that the nineteenth century has produced." The appearance of the first volume, therefore, is attended with special interest, as it affords opportunity to see how far it fulfills the extravagant announcements of the publishers. The scrutiny to which it will be subjected will be closer than if it had been heralded a little more modestly, and the standard by which it will be judged must be that which it has itself set up. The flourish of self-assertive trumpets, which characterizes this announcement, may be quite the thing from the ordinary mercantile point of view, but it is not agreeable to the instincts or traditions of the scientific physician, who is unpleasantly reminded of Barnum and his announcements of "My Greatest Show on Earth," *et id omne genus!* The name itself of the work, high sounding and rotund, as it is, has an unpleasant smack to it; an encyclopædia must be a big thing, but an international encyclopædia a bigger.

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[1] The International Encyclopædia of Surgery. A Systematic Treatise on the Theory and Practice of Surgery. By authors of various nations. Edited by John Ashurst, Jr., M. D., Professor of Clinical Surgery in the University of Pennsylvania. In six volumes, royal octavo. Illustrated with chromo-lithographs and wood engravings. New York: William Wood & Co. 1882.

Unfortunately international walking matches, prize fights and boat races have brought the term international into disrepute. We may be hypercritical in thus questioning the title of the work, especially as the co-operation in the execution of the work by European surgeons is the excuse for it. There is no accounting for tastes. The use of this adjective attached to a surgical publication does not seem to us in good taste; it may make the work sell better now, and if so it will have answered the publishers' ends, but in twenty years from now it will only cause a smile, or a shrug of the shoulders as a sample of American spread-eagle-ism.

At no time more than the present have surgical doctrines and methods been in a greater state of ferment. There is an unwillingness to recognize the dictum of anyone as authoritative on any matter. It is a period of transition, and naturally the literature of the period must partake of the character of period. It is a time for "contributions to knowledge," for memoirs, notes and clinical reports, rather than for systems.

The need of the medical profession is for books that shall recognize in their making this transient character, that they are soon to be replaced by others; they ought, therefore, to be cheap, that the frequent purchase of the latest work may be possible to the physician of moderate income. The standpoint of publisher and physician, in this matter of medical literature, is evidently entirely different. The physician dwelling in Arcadia, in his simplicity, supposes that the medical book publisher is the servant of the medical public, whose wants he studies. From a seat on the border land of Arcadia it is probable that this present review is being written. It is not so far removed from the real world, however, but that it appreciates the fact that the real status of the book publisher is more like to that of a patronizing house-wife plucking the medical goose. Now, in the matter of furnishing the practitioner with a satisfactory exposition of surgery, as it stands to-day, the work certainly must assume an encyclopædic character, and "each topic should be discussed by an author of established reputation, who has made it the object of special investigation." A series of essays of such character, covering the whole field of surgery, appearing in regular succession, in uniform style, and at moderate cost, would find ample support, without recourse to methods of forcing its sale outside the ordinary channels of trade. "Special fonts of type, beautifully clear and distinct; high-surfaced and delicately tinted paper, and binding of an extra-fine quality," are very desirable things for those who can afford to pay for them. If a practitioner expected to buy but one treatise during his lifetime he might desire to invest in books thus gotten up. It is possible that some younger members of the profession may be beguiled into the belief that by this particular encyclopædia their needed surgical library will be complete. The tendency of the book, as gotten up and brought before the profession, is certainly to foster such a feeling, and it is a feature of it against which we wish to earnestly protest.

When surgery shall have ceased to make any progress, and is ready to be embalmed, then will be the time for it to be delivered over to the book-makers to be set properly in magnificent volumes, none sold separately, but, as a whole; and constituting a beautiful monument, to be enshrined behind glass doors, on our library shelves. The separate essays, which are to constitute the encyclopædia of William Wood & Co., ought, in addition to their present shape, to be accessible as separate monographs, cheaply bound, through the ordinary channels of trade, at reasonable prices. The first volume of this encyclopædia, now published, is a bulky book of over 700 pages, large octavo, and contains seventeen different essays, by as many different authors, on subjects embraced under the heads of general surgery, operative, minor, and plastic surgery and amputations. Of each of these essays we append a separate review; but in this place it is proper to refer to the illustrations which the volume contains, for which the publishers are supposed to be responsible. These are to be found mostly in the essays on minor surgery and amputations. They would be coarse, cheap and wretched anywhere, but appear especially so in a book of the pretentious get-up of this one. Many of them have been furnished without expense to the publishers, by instrument makers, who receive an excellent advertisement in return by the appearance of their names on the cuts. Such cheap make-shifts in the way of illustrations cannot be palmed off without exciting the indignation of the subscribers, and we are sure that none will feel the wrong more deeply than the authors of the essays, which are thus defaced.

DISTURBANCES OF NUTRITION. THE PATHOLOGY OF INFLAMMATION.[1]

The first article in this volume, by which the whole work is ushered in, occupies 62 pages, and is clear and strong in its style, so that the reader cannot mistake the author's meaning. It begins by a discussion of the causes of hyperæmia and ischæmia as determined by variations in the calibre of the vessels, the discussion involving, first, the arrangements in the vessels for the production of contraction; second, the contractility of the capillaries; third, the *modus operandi* of these movements respectively; and lastly, the nerves which govern these contractions. The author considers, as of very great importance, the doctrine of the intrinsic contractility of the capillaries, a doctrine not yet generally accepted, though advanced by him as early as in 1865. He teaches that capillaries are formed by the hollowing out of masses of protoplasm, so that in their embryonic state they consist of contractile protoplasm. He thus rejects the cellular theory, and substitutes in its place a theory which makes a protoplasmic mass, the fountain of all organization. After a review of the doctrine of Virchow of the connective-tissue cell origin of pus corpuscles, and the white blood corpuscle immigration theory of Cohnheim, he concludes with an *Io triumphe*, thus: "I also can now clothe the doctrine of inflammation in a simple form. *Metamorphosis of tissue; return to the embryonic condition; division into amœboid cells of the masses which have become movable; hence the destruction and suppuration.* This is briefly the outline of my new doctrine."

These conclusions are based upon studies of keratitis in mammalia. He teaches further that inflammatory infiltration or induration is the result of swelling of the cell network of a tissue by absorption of new matter from the blood ; as the cell network enlarges the basis substance disappears ; the protoplasmic masses which arise from the swollen cell network subdivide, fall apart, and pus corpuscles are produced. By this destructive process not only are pus corpuscles isolated, but also small granules, small shreds of the cell network, and larger pieces of tissue débris, the assemblage of which constitutes *pus*. He rejects entirely the agency of any immigration of cells in the production of pus. The concluding 20 pages of the essay are devoted to demonstrating that inflammatory processes in all the tissues of the body are essentially the same as those in the cornea, which has been selected as the most favorable field in which to pursue investigations into the pathology of inflammation. LEWIS S. PILCHER.

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[1] By S. Stricker, M.D., Prof. of Experimental and General Pathology in the University of Vienna, Vienna, Austria.

INFLAMMATION.[1]

In this article, inflammation, from the standpoint of clinical observation, is considered. At the outset the author remarks, very truly, that the definitions of inflammation furnished by the latest teachings of science do not convey the full significance of the term as employed in the ordinary language of the surgery of the day. His statement awakens the hope that the author, in what follows, will attempt to rescue the word inflammation from the muddle into which it has fallen; for no fact is more certain to-day than the bewildering uncertainty in which the teachings of the past, and of the pathologists and clinicians of the present have involved this term. It has now no definite clinical signification ; the traditional conditions for the description of which the word was originally appropriated still remain, but inasmuch as modern pathologists have found that these conditions are but modifications of simple reparative processes they have extended the name to embrace these latter as well, and thus have wrought confusion in surgery. Carried along in this current, Prof. Van Buren says: "The term inflammation will be employed in the ensuing pages as including the series of textural changes—microscopic as well as macroscopic—which take place in living tissues after they have been subject to injury. For the sake of convenience the term 'constructive' will be applied to the phenomena of afflux, exudation, cell-germination, the formation of new capillary vessels and the development of cicatricial tissue—in other words to the inflammatory phenomena which constitute the simple uncomplicated 'process of repair,' whilst the additional presence of suppuration, ulceration, or gangrene, and all other harmful complications of the process will be included under the term 'destructive.'"

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[1] By W. H. Van Buren, M.D., LL.D., Prof. of the Principles and Practice of Surgery in the Bellevue Hospital Medical College, New York, N. Y.

Here is seen the gist of the whole matter. Construction and destruction are alike included under the one term inflammation, which term always has been, and generally is now used only in speaking of destructive processes; to apply it to constructive processes demands a mental wrench that is difficult and painful. It is to be regretted that the author, from his clinical standpoint, did not give his influence to a restriction of the term inflammation to harmful complications in the processes of repair. What need is there for the extension of this designation to the simple uncomplicated processes of repair?

The scope of this article includes a discussion of the causes, symptoms, varieties, consequences and complications of inflammation. The greatest interest in its examination will attach to the views which it may present of the action of micro-organisms as causes of inflammation. This part of the article is rather a review of the recent investigations on this subject than an attempt to formulate definite teaching; the investigations of Koch upon the action of microscopic cryptogamic parasites in the etiology of traumatic infective diseases are freely quoted. The investigations of Pasteur, Burdon-Sanderson and Klebs are also referred to, but the more recent and remarkably instructive investigations of Ogston are not mentioned. His final summary, based upon the experiments of these investigations and upon the results of clinical experience, is as follows:

"That the unhealthy and destructive phases of the inflammatory process are directly due to contamination by these omnipresent ærial organisms seems also for the far greater proportion of cases infinitely probable, but it awaits final confirmation."

LEWIS S. PILCHER.

ERYSIPELAS.[1]

Erysipelas is treated of in an admirable essay of forty pages by Professor Stillé. The various forms of the disease are accurately and sufficiently described. The author fully believes in the septic and constitutional nature of erysipelas, and also in its contagiousness, on which he lays great stress, enforcing his views by showing the connection between this disease and puerperal fever. A notable portion of the article is devoted to the subject of treatment, and in this especially will be observed the caution and judicial attitude which characterize the writing of this well-known therapeutist. He gives his sanction to nothing which has not been proved to be useful. Excepting in the surgical treatment of phlegmonous erysipelas, he has no faith in the influence of local applications, beyond that which they exert as protectives and palliatives. Depletion he mentions simply to condemn, and alcoholics are declared to be not only unnecessary, but injurious, in ordinary cases. A mild emetic and a brisk purgative are recommended for their depurative effects, and the tincture of the chloride of iron is credited with a good deal of controlling power over the morbid process. The chapter is eminently sound, learned and attractive, and will afford valuable assisttance to the practising surgeon and physician. F. H. GERRISH.

PYÆMIA AND ALLIED CONDITIONS.[2]

Professor Francis Delafield contributes the article on pyæmia and allied conditions. After saying that "ordinary usage, at the present day, applies the term pyæmia to those cases in which infarctions, abscesses, and local inflammations are present, while the term septicæmia is employed to designate cases in which similar clinical symptoms exist, but in which no lesions are found," he mentions the etymological objections to these names in the present state of knowledge, and announces that, "in this article, the word pyæmia will be used to designate the entire group of cases." With this warning, nobody who is searching for means of differential diagnosis between pyæmia and septicæmia will expect to get satisfaction from reading this essay. He will find the two words applied indiscriminately to all kinds and stages of surgical blood-poisoning, and will learn that pyæmia is a sufficiently elastic appellation to include the gentlest febrile movement occurring after a wound or injury, as well as the most violent attack of putrid infection associated with metastatic abscesses. Possibly the author has taken the most judicious course in making no effort to clear away difficulties which have baffled some very eminent observers; but, to have a prominent teacher proclaim that there is just as much ground for confusion of views now as there was fifty years ago is rather discouraging, to say the least, particularly when many writers have led us to believe that it is often possible to distinguish one of these conditions from the other.

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[1] By A. Stillé, M.D., LL.D., Prof. of Theory and Practice of Medicine in the University of Pennsylvania, Philadelphia, Pa.

[2] By F. Delafield, M.D., Adjunct Professor of Pathology and Practical Medicine in the College of Physicians and Surgeons, Medical Department of Columbia College, New York, N. Y.

Dr. Delafield believes that "when the symptoms are once fairly established, treatment is of no avail"—a hopeless attitude against which the writer feels compelled to strenuously protest, as doubtless would the majority of practical surgeons, especially in view of the sweeping inclusiveness of the term pyæmia as used in this paper. But the author is a firm believer in the efficacy of preventive measures, such as the general management of the patient, the hygiene of hospitals, and the employment of antiseptics, of which carbolic acid is stated to be distinctly the best.

A brief, but lucid, explanation is given of the Lister method, which is accorded the credit of much of the success of modern surgery. The descriptions of the pathological changes are clear and concise, and there are two excellent colored plates illustrating metastatic abscesses. The article displays research and a ready familiarity with the theories which have been, and are held concerning pyæmia, but is not cheerful reading for those unreasonable and impatient people who want to get well-defined ideas of the disease, and to learn how to combat it successfully. F. H. GERRISH.

HYDROPHOBIA AND RABIES; GLANDERS; MALIGNANT PUSTULE.[1]

This article on Hydrophobia, Glanders, and Malignant Pustule contains, in all, about 15 pages. Hydrophobia takes eight pages in *Reynold's System*, fine type, double columns, to ten pages in the *International*, so that the former article (*Reynold's*) is *really larger*, to say nothing of its greater conciseness. Dr. Forbes has not given us an exhaustive article. All classical references are apparently wanting, and the history of past epidemics is very scanty. He quotes Youatt, but seems to overlook the work of Coleman, Leblanc, Renoult, Schroeder, Gamgee, and others. He is too brief and superficial on many important points ; nor does he draw sufficient attention to the differential diagnosis from acute mania, although he lays much stress on that of tetanus and œsophagitis. The account of treatment is better written and quite readable, and a considerable proportion is derived from American sources. The account of Glanders is too incomplete and fragmentary, but usually correct as far as it goes, being largely derived from Youatt. Two pages are devoted to the history of the Malignant Pustule, and yet little more is told us than in one-fourth page of *Holmes' System*. Too much diffuseness prevails here.

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[1] By Wm. S. Forbes, M.D., Demonstrator of Anatomy in the Jefferson Medical College; Senior Surgeon to the Episcopal Hospital, Philadelphia, Pa.

N. B. SIZER.

SCROFULA AND TUBERCLE.[1]

Mr. Butlin has considered the important subjects of Scrofula and Tubercle in a short article, having attempted the merest outline of reference to the many points which a consideration of these subjects demand. Readers of the Encyclopædia will be disappointed in this article by reason of its meagreness. The plan which the author has adopted is to detail a few cases, strikingly exhibiting forms of each disease, and then to elaborate his remarks from these as a text.

As evidence of the shifting character of the pathology of to-day, this essay is hardly published, when a German pathologist, one of the most eminent and careful of investigators into micro-organisms, Koch, announces the discovery of the bacillus of tuberculosis, a small bacillus, which he has succeeded in cultivating through six or eight generations without diminishing its power, growing very slowly, and essentially different from all the other pathogenic bacteria and micrococci.

As to the relations of Scrofula to Tubercle, the author says that many of the affections described as scrofulous can only with difficulty be distinguished clinically from those associated with tubercle, and even when the diseased structures are examined after removal or death, the appearance presented by the two diseases are so similar that the diagnosis can be made only by microscopical investigation. We look in vain, however, for any statement of what the microscopical differences are by which we can make this fine distinction, and are left to infer that whenever Mr. Butlin finds certain peculiar spheroidal bodies in a tissue or mass, he says, tuberculous; and if he fails to find them, he says, scrofulous, whatever the clinical conditions may have been. He starts well by defining scrofula to be "a condition of the body, or of certain portions of the body, in which inflammations are easily excited, in which they tend towards suppuration and ulceration; and in which the power of spontaneous recovery is very feeble," but is unable to escape the fault of considering it as a disease itself in much of what he says. If it is a condition—*i. e.*, a quality, it has no morbid anatomy, and it is to be studied, if with profit, from an entirely different standpoint from that of the disease, tubercle. LEWIS S. PILCHER.

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[1] By H. T. Butlin, F.R.C.S., Demonstrator of Surgery in St. Bartholomew's Hospital, London, England.

RACHITIS.[1]

Dr. Smith presents here a somewhat enlarged and rather more detailed edition of his essay upon rachitis, familiar to most American students as forming one of the chapters in his work on Diseases of Children—the illustrations even having a familiar appearance. He considers that rachitis is a much more common disease than is generally supposed. He distinguishes between the rachitis of infancy and analogous troubles occurring in adolescence, considering that the former, "with few exceptions, begins within the first eighteen months of life." He omits all reference to the influence of acute or chronic disease or traumatism in producing the disease, although he devotes considerable space to its production by lactic acid naturally and artificially, the latter as detailed in the experiments of Heitzman. He describes quite fully—without explanatory plates, however—the histological changes to which the bone and cartilage are subjected, very properly leaving in doubt the exact process by which they are produced. He quotes, as expressing his view of the nature of rachitis, the opinion of Niemeyer referring it to "inflammation of the epiphyseal cartilages and periosteum." After describing considerably in detail the anatomical characters, under the heads of (1) proliferation and altered nutrition of cartilage and periosteum; (2) that of curvature and deformity; (3) that of reconstruction, he describes the symptoms, briefly and rather inadequately, particularly emphasizing the excessive tendency to perspiration and general tenderness on pressure. The treatment consists largely in improved diet and hygienic surroundings, with medicinal treatment of a nutritive and tonic character. JAMES E. PILCHER.

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[1] By J. Lewis Smith, M.D., Clinical Professor of Diseases of Children in the Bellevue Hospital Medical College, New York, N.Y.

SCURVY.[1]

Surgeon-General Wales' article on Scurvy is scholarly and exact, although somewhat lacking in condensation. This seems to be the only way in which the article is inferior to those in *Holmes'* and *Reynold's*. The historical part is learned and interesting, and, seems to us, as good literary work as any in the volume. N. B. SIZER.

RECIPROCAL EFFECTS OF CONSTITUTIONAL CONDITIONS AND INJURIES.[2]

The article on the Reciprocal Effects of Constitutional Conditions and Injuries is contributed by the distinguished Professor Verneuil, of Paris. This able clinician has given us a useful article, which would be twice as valuable if condensed to one-half its present size, because *twice as easily remembered.* It is written in the French diffuse style, familiar to those who read that language. It is unfortunate that several terminological awkwardnesses have been allowed to stand; for instance, we are not aware that the herpetic diathesis is recognized in this country; neither should the other barbarisms of hepatism, nephrism and cardism be permitted to remain. A rewriting of the whole article would make it valuable, pungent and practical. N. B. SIZER.

GENERAL PRINCIPLES OF SURGICAL DIAGNOSIS.[3]

This article is a reprint, slightly condensed, and but little altered in its phraseology, of the very excellent introductory chapter to the work on the "Principles and Practice of Surgery," now in course of publication by the same author.

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[1] By P. S. Wales M.D., Surgeon-General U. S. Navy, Washington, D.C.

[2] By A. Verneuil, Professor of Clinical Surgery in the Faculty of Medicine of Paris, France.

[3] By D. Hayes Agnew, M.D., LL.D., Prof. of Surgery in the University of Pennsylvania, Philadelphia, Pa.

LEWIS S. PILCHER.

SHOCK.[1]

Opening with the pseudo-definition that shock is "associated with a sudden check to the circulation brought about through the agency of the nervous system, and resulting either in a death so immediate as scarcely to have a parallel or in a condition of prolonged prostration with or without a more or less successful reaction," this author passes on to rehearse in a somewhat loose style the causes of shock, giving a prominent place to mental emotions. After a brief discussion of the cases in which this accident is liable to occur, he proceeds to detail the symptoms; in this he is strikingly successful, the picture drawn of the patient's condition standing out with remarkable boldness. The pathology and prognosis having received due attention, the treatment is taken up; he forcibly emphasizes the use of stimulants, particularly of brandy, ammonia or digitalis. In a brief note he considers the pathology and symptoms of fatty-embolism giving considerable space to the former, and discussing the latter particularly from the standpoint of differential diagnosis. JAMES E. PILCHER.

TRAUMATIC DELIRIUM AND DELIRIUM TREMENS.[2]

This is one of the best essays which this volume contains. Its excellent and life-like descriptions are evidently drawn from a full experience, and reflect the observations of a practical mind. In his remarks on the anatomy of delirium, the author gives his reasons for believing that it is due to irritation of the cortical gray matter of the posterior half of the cerebrum. As to its diagnosis he says that it declares itself, and hence there is nothing very profound to be said on that score. He discusses with sufficient fullness the conditions in which traumatic delirium is likely to occur, and gives the principles of treatment concisely and clearly. In his discussion of the surgical relations of delirium tremens he is very happy. The following extract will afford an example of his style:

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[1] By C. W. Mansell-Moullin, M.A., M.D., Oxon., F.R.C.S., Fellow of Pembroke College, Oxford; late Radcliffe's Traveling Fellow, Univ. Oxon; Surgical Registrar to the London Hospital, London.

[2] By William Hunt, M. D., Surgeon to the Pennsylvania Hospital, Philadelphia, Pa.

A layman may imagine how such an interloper as delirium tremens must interfere with satisfactory surgical practice, but no one but a surgeon can appreciate the fact. It plays havoc with all his calculations. It displaces well-adjusted fractures, reproduces dislocations, tears open wounds, disturbs dressings of all kinds, removes ligatures and sutures, makes simple injuries compound and complex, sets up irritative abscesses and exudations, and so opens the door for erysipelas and pyæmia; in fact, it is a fiend, sitting like a cormorant hard by the surgeon's efforts, and devouring all his measures for good.

The peculiar tremors of delirium tremens, he says, are loose and free, without spasmodic jerkings; somewhat jelly-like, and giving a general idea of instability. They seem to say "prop me up, prop me up; if you don't prop me up I shall die." The reading of the whole article is refreshing, as well as profitable. LEWIS S. PILCHER.

ANÆSTHETICS AND ANÆSTHESIA.[1]

Dr. Lyman's notes on Anæsthetics are quite readable and pleasant, being much in the style of his large book, by the same publisher. The text appears to be ordinarily accurate and useful. The printing of the wood cuts in this article is not at all artistic, nor, for that matter, are the cuts themselves. N. B. SIZER.

OPERATIVE SURGERY IN GENERAL.[2]

Time was when a treatise bearing the title of "Operative Surgery" was presumed to be a work possessing peculiar and distinctive features. Nearly seventy years ago Sir Charles Bell, who seems to have been the first English author to prepare a formal work of this kind, stated, in the preface to his book, that his main object was to aid the surgeon, upon the eve of an operation, to bring his judgment to bear maturely "on all the points of the case; the objects to be attained; the dangers to be expected; the resources which he ought to have in readiness against probable mischance." Since the inception of such a help to the busy surgeon, down to the present day, many able works, having the same object in view, have been offered to the profession; all of these latter possessing, more or less, completely the leading characteristics of the work of the distingushed master. It is fair to infer, from the favor with which these works, as a rule, have been received, that they fulfilled, in some degree, the demands of the professional mind. At all events, it seems to be reasonably well-established, as a fact, that a work of this kind, in order to be of the greatest possible use to the surgeon, should comprise a consideration of the necessities for operative interference, a glance at the more important surgical land-marks, together with some mention of the fallacies of the regional anatomy, and the proportion of cases in which these fallacies are met; the different procedures should be commented upon, and that which in the author's judgment best answers the purpose, and gives the best results, recommended and described in all its essential details, setting forth the errors most likely to occur in their performance, and the best methods of avoiding them.

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[1] By H. M. Lyman, M.D., Professor of Physiology and Diseases of the Nervous System in the Rush Medical College, Chicago, Ill.

[2] By J. H. Brinton, M.D., Lecturer on Operative Surgery in the Jefferson Medical College, Philadelphia, Pa.

Viewed in the light of these requirements the essay upon "Operative Surgery," in the International Encyclopædia of Surgery, can scarcely lay claim to be considered as being more than a hasty glance at some of the points bearing upon the subject.

Under the head of "Qualifications of a Surgeon," the essayist seems to have attempted, in a general way, to establish a sort of an ideal standard of excellence for the operative surgeon, at the same time acknowledging that these qualifications "appear to be varied and comprehensive." It goes without saying that in this department, as in all others of our profession, the practitioner should be "thoroughly honest;" and that he should be "adroit," and possess "a knowledge of anatomy," as essential qualifications are equally self-evident facts. Latterly, the civil law has defined what may reasonably be expected, in the matter of qualifications of a surgeon, in a far more judicious manner than can be possibly done by the setting up of a standard of excellence by any writer; that there can be no fixed limit to the demands upon the resources of the surgeon in the way of skill and knowledge will be admitted, when it is known that the circumstances of each individual case are liable to constant variation, as well as varying, in its general features, from all other cases.

If every surgeon, before accepting the responsibility of a case, were to see to it that he is reasonably secure against adverse criticism on the part of his professional brethren, as well as rebuke from judicial decisions and legal opinions, he would adjust his own standard of qualifications upon a plane calculated to meet all of the exigencies of that particular case. In other words a reliance upon the dictates and demands of that great genetic conscience, public opinion, may well serve him in the absence of a better guide.

If the relative importance of manual skill and dexterity and the "demeanor of the surgeon" were to be judged by the attention bestowed upon them, the former would certainly suffer by comparison, inasmuch as but fourteen lines are devoted thereto, while the latter rises to a dignity not generally accorded it by occupying the greater portion of a page.

In view of the fact that the article immediately preceding the one under review has nearly as much space devoted to it for the consideration of anæsthetics and anæsthesia alone as our essayist has alloted to him for the whole subject of operative surgery, it would seem as if the remarks upon the former, which he has incorporated in his article, might well have been omitted altogether, since it has simply led to a needless repetition, and hence waste of valuable space needed for a fuller elaboration of what follows. However, since mention is made of methods of producing artificial anæsthesia, justice and courtesy both demand that the very simple ingenious and efficient apparatus of Allis for economizing ether and bringing the patient rapidly and safely, as well as pleasantly, under its influence, should have received notice. In speaking of the primary anæsthesia obtainable by ether, our author fails to note the fact that a similar state may be brought about by the use of chloroform, the latter agent, however, possessing an advantage in that its primary anæsthesia lasts rather longer than that of ether, thus giving a wider scope for its application.

The consideration of the subject shock should have been, in our judgment, more fully elaborated as a part of this essay, or this its legitimate place being denied to it, it should have been treated of exclusively in the paper by Mansell-Moullin, in the same volume. The section devoted to "Mode of Conducting an Operation," simply consists of a few commonplace remarks upon the performance of operations in general, followed by some useful hints regarding the application of Esmarch's bandage and a passing notice of the subject of drainage. It is to be hoped that the latter will receive the attention which its importance demands in the announced special article upon antiseptic surgery. "The treatment of patients after operation," and "the conditions determining the results of operations," are well written and fully up to the advanced teachings of the day. The observations upon "Causes of Death after Operations" includes hæmorrhage, shock, delirium, thrombosis and embolism, air in veins, gangrene and sloughing, tetanus and erysipelas, the whole being cursorily alluded to and dismissed in less than five pages. GEO. R. FOWLER.

MINOR SURGERY.[1]

In the space of fifty pages, Dr. Hunter has attempted the task of treating of what is commonly known as "Minor Surgery," this being generally understood to mean surgical dressing, and what usually pertains to the duties of a surgeon's assistant or dresser. That such a treatise may be made of the greatest utility, it should include the best of old methods, and a judicious selection of new ones pertaining to this department. How well these requirements have been fulfilled may be imagined when it is known that, whereas, four entire pages are devoted to the consideration of forms of dressing now pretty generally considered inadequate, and by very many surgeons positively dangerous, in exactly fifteen lines is said all that the author has to say about the popular antiseptic dressing of Lister; the remarks therein contained referring only to the protective and Mackintosh. Sixteen pages are devoted to methods of bandaging special regions; some of these have but slight applicability, a few are altogether obsolete, while most of them would suggest themselves to the average practical mind. On the other hand, strapping the female breast, strapping a testicle and the application of adhesive plaster for the purposes of a retentive dressing, as well as for extension and counter-extension are conspicuous by their absence. That these very important uses of adhesive plaster should not have at least called for the mention of this necessary part of a surgeons outfit is one of the mysteries. The remarks upon revulsives and counter-irritation, though brief, are to the point. Attention is called to the method of cupping by means of common tumblers in the absence of a special apparatus. Under the head of transfusion of blood, our author goes somewhat into details, the apparatus of Aveling for direct transfusion being described at some length. The Roussel instrument, so complicated in its mechanism as to render it unsafe, except in the hands of one perfectly familiar with it, is figured and described, while the ingenious, yet simple and safe instrument of Collin, in using which it is almost impossible to inject air into the vein, is barely mentioned. Philadelphia writers are very fond of calling attention to methods and means commonly employed "in this city," and our author, in speaking of the Allen-Morton-Hunter transfusion apparatus falls naturally into the habit. The description of the surgical uses of electricity is as intelligible and instructive as is possible, consistent with the brevity which the author seems to have been compelled to observe. Dr. John Byrne's galvano-cautery battery is deservedly well spoken of. Galvanization and Faradization are honored by a slight mention ; massage is described in its different manipulations, the essay ending with a section devoted to that comparatively impracticable instrument, to the surgeon at least, the sphygmograph. Dr. Hunter has in the main done the best that could have been done with the space allotted to him. The errors in his treatise are those of omission, rather than of commission ; for these the policy of the publishers of the work is to be held responsible. George R. Fowler.

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[1] By C. T. Hunter, M.D., Demonstrator of Surgery in the University of Pennsylvania, Philadelphia, Pa.

PLASTIC SURGERY.[1]

In an Encyclopædia of Surgery one would naturally look for a complete, although, perhaps, outline review of the whole field of so important a branch as Plastic Surgery. The historical notes should be sufficiently full to present, in brief, all the steps taken in bringing the art to its present condition, attention being given to each in proportion to its relative importance. This portion should not, however, in a systematic Treatise on the Theory and Practice of Surgery, monopolize the whole of an article, nor even a large portion of it. The practice of the art, its methods of procedure and applicability, is what is sought by the surgeon who, in the absence of special works upon this topic, resorts to his Encyclopædia for information with regard to a proposed plastic operation. If this hypothetical busy practitioner, in blind faith as to the results of his search, consults this "most complete, the most thorough, the most practical, and, withal, the most authoritative Treatise on Surgery extant," (*vide* prospectus), he will be amazed to discover a very accurate—pages fairly bristling with authorities—skeleton upon which to base a historical sketch of skin-grafting and but little more. This article on Plastic Surgery occupies nineteen pages, of which two are devoted to a general historical review, five and a half to Plastic Surgery in general, nine and a half to the history of skin-grafting, and three to the applications of skin-grafting. Verily the faithful students of "the most complete," etc., should be firmly grounded in the history of skin-grafting! In order to effect a clear understanding of the various methods, the clinical teacher illustrates upon his patient, but the author of a treatise being debarred from actual illustration, has recourse, if he effectively elucidates his topic, to the artist and the engraver. But when we look for illustrations of the methods of operation in this treatise, we find that the "chromo-lithographs and wood engravings" (*op. cit.*) are conspicuous only by their absence. The regional applications of Plastic Surgery meet with the most summary dismissal—rhinoplasty, cheiloplasty, blepharoplasty, genoplasty, etc., not being named. But, to cap the climax, in no place does the author describe or illustrate, or refer, except in the most cursory way, to the methods of performing the operations which he enumerates. No mention is made of the dressings necessary to be applied. Nothing is said of the applications of the antiseptic methods to Plastic Surgery. The important advance made by Wolfe, of Glasgow, in transplanting, without a pedicle, large flaps of from one to three inches in diameter, in its application to blepharoplasty, has also entirely escaped the attention of the author. He nowhere, notwithstanding the disproportionate space given to skin-grafting, describes a method of preparing or applying the grafts. In fact, its merits are so thoroughly obscured by its defects, that the article, as a whole, must be pronounced superficial, incomplete, and extremely deficient in practical usefulness.

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[1] By C. Johnson, M. D., Professor of Surgery in the University of Maryland, Baltimore, Md.

JAMES E. PILCHER.

AMPUTATIONS.[1]

A great deal of care and painstaking have evidently been bestowed upon this essay. Beginning with some philosophical observations upon the general subject, and an historical sketch of amputations, the writer passes to a consideration of the conditions calling for amputation, and in a plain and straightforward, yet forcible manner treats of most of the accidents and diseased states generally in which it becomes desirable or imperatively necessary to sacrifice a limb. Some space is occupied in a description of the various instruments needed, a few of which are not recommended. He prefers metallic sutures, and as an argument in their favor calls attention to the fact that they can be untwisted subsequently to their application if they appear to exercise too much strain upon the tissues. This is a practical point of considerable value.

Under the head of "Operative Methods employed in Amputations," the various methods are regarded simply as modifications of the circular and flap, and some general remarks are made upon these methods. Commenting upon the relative advantages of the different modes of amputating, the writer makes this very sensible remark : "I cannot conscientiously say that I think that the form of operation adopted exercises any marked influence upon the result. The judgment manifested in determining whether an amputation shall or shall not be performed, and the care taken in the after-treatment of the patient are of much greater importance." In a general way, however, he states the points to be attended to in choosing between circular and flap operation according to the region to be operated upon. After detailing quite a number of different methods of dressing the stump, the author, in unequivocal terms declares his preference for the pure laudanum fomentations of the late Prof. Joseph Pancoast. Its antiseptic and soothing properties, the first named being due to the alcohol, are the advantages claimed for this agent. A special plea is made for moist dressings covered with some impermeable material. The recommendation regarding the withdrawal of drainage tubes about the eighth day, overlooks the fact that they may be a source of irritation long before that time, and should be dispensed with at the earliest possible moment. Prof. James R. Woods "open method" is noticed, and the opinion ventured of its superiority over the analogous so called "air dressing" of Teale and Humphry, (which latter by the way is no dressing at all, but simple exposure to the air), but from its failure to aim at securing primary union is deemed a step in the wrong direction. The late Mr. Callender's "amputation splint," for facilitating the painless dressing of a stump during the after-treatment, which only requires to be more widely known to be appreciated in this country, has failed to secure any notice. The method of suspending the stump by elastic cords instead of resting it upon a pillow, and which is so conducive to the patient's comfort and ease, allowing as it does considerable freedom of motion in bed, has likewise been lost sight of. Under the heading "Mortality and Causes of Death after Amputations," the writer, while admitting the fallacy of attempting to decide the question of the best modes of operating and dressing by any available statistics, thinks that there are some points connected with the conditions present for which amputation may be required, as well as the proper time to operate, upon which light may be thrown by that method of study. He then gives some very interesting and suggestive figures bearing upon these points. The special amputations described are, as a rule, judiciously selected. The beautiful substitute for Chopart's amputation suggested by Tripier certainly deserves, however, a description sufficiently intelligible to bring out its useful points. The essay ends by giving a tabulated synopsis of six hundred and thirty-three cases of hip-joint amputations, a larger number of reliable reports, it is ventured, than have ever before been gathered together of this operation.

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[1] **By John Ashhurst, Jr., M.D., Professor of Clinical Surgery in the University of Pennsylvania, Philadelphia, Pa.**

Thus, in upwards of one hundred and fifty pages, Dr. Ashhurst has treated the subject of amputations somewhat exhaustively. It is a noticeable fact that he has occupied for this purpose somewhat more than three times as much space as the average allotment to other essayists whose writings appear in this volume ; that he has made, upon the whole, good use of his opportunity no one can deny.

George R. Fowler.

THE TREATMENT OF CICATRICIAL CONTRACTIONS.[1]

By ALFRED C. POST, M. D., LL.D.,

OF NEW YORK,

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TO THE NEW YORK, ST. LUKE'S AND THE
WOMAN'S HOSPITALS.

CICATRICIAL contractions are the result of burns, of sloughs, of ulcerations, and of wounds, with loss of substance. They are caused by the exuberant growth of granulations, and subsequent contraction and induration during the healing process.

The following are the principal malformations resulting from the contraction of cicatrices: First. The margins of the orifices of mucous canals are everted, or drawn asunder, so that they cannot be closed. Examples of this kind are the wide separation of the eyelids, or of the lips, and the dilatation of the nostrils. Second. The orifices of mucous canals are contracted or closed; the eyelids, the mouth, the nostrils, the auditory canals, the anus, the urethra, the vagina, the œsophagus, and so forth, may be contracted in this manner. Third. The features may be disfigured by being drawn into abnormal positions. These distortions may affect the nose and mouth, the ears, the chin, and so forth, by being drawn out of their proper line. Fourth. Apposed cutaneous surfaces may become adherent. This kind of deformity is exemplified by the webbing of fingers and toes, by the adhesion of the arm to the thorax, or of the thighs to each other. Fifth. Fixation of one or more of the extremities in a position of exaggerated extension or of flexion, abduction or of adduction. Sixth. Permanent ridges on the surface, often more or less painful, and predisposing to cheloid, or other degenerations. These are the six principal forms in which we meet with malformations arising from cicatricial contraction.

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[1] A lecture delivered before the Brooklyn Anatomical and Surgical Society, December 19, 1881.

The next subject is the prophylactic treatment. When a surgeon is called to the treatment of a case in which there has been an extensive loss of substance, or destruction of tissue from any of the causes which have been indicated, he may employ either or all of the following means to guard against the occurrence of deformity. First, and this is a very important matter, the growth of exuberant granulations may be kept down by pressure and by the application of escharotics as often as may be necessary. Second. The parts must be supported in such a position as to guard most effectually against the threatened deformity. Third. Incisions may be made from time to time in such parts as to favor the healing process, by contraction in the least injurious direction. These incisions may assume the form of V incisions, of ◊ incisions, of stellate incisions, or of circumvallation—that is, circular or oval incisions all around the affected part, so as to overcome for the time being the tendency to contraction. Fourth. Skin grafting may often be resorted to, with advantage, to form new centres for the healing process, and thus to diminish the amount of cicatricial contraction. Fifth. During the reparative process passive motion should be frequently employed to a very considerable extent, in order to stretch the newly-formed tissues, and to render them softer and more pliable. These are the principal prophylactic measures to be employed in order to guard against the deformities arising from the healing of parts in which there has been an extensive loss of substance. When cicatricial contractions have already occurred, and have produced their characteristic deformities, appropriate treatment is to be employed, according to the character of the malformation to be overcome.

In the first class of deformities—namely, that in which the margins of the orifices of the mucous canals are everted or drawn asunder, the cicatricial bands are to be freely divided, so that the orifices can be completely closed, and a flap of sound integument dissected from the neighboring part and inserted between the edges of the wound, so as to fill up the chasm produced by the closure of the orifices. The flap thus inserted should be of ample dimensions, so as to allow for the contraction which will subsequently take place. The flap which is transplanted should always be somewhat larger than the space it is designed to fill; the pedicle should be of sufficient breadth to maintain the vitality of the flap, and a sufficient thickness of sub-cutaneous tissue should be raised with the integument, to secure a good vascular supply. The flap may be transplanted by the Indian method, that is, by twisting the pedicle on its apex, or by the French method, gliding the flap along without a twist. When the latter method is adopted, it is often advantageous to curve the pedicle, as by this means the tension is greatly diminished, and the flap is more readily brought into its place. For example, suppose we have a quadrilateral chasm to be filled up. We attempt to fill it up by a rectangular, quadrilateral flap, which is glided along by the French method. If you attempt to draw this flap across, there will be very apt to be a degree of tension, which will interfere with the union of the flap in its new situation; but if you can arrange it so as to give it a curved pedicle, the flap itself being adapted to the shape of the chasm it is designed to fill, as you draw the flap into its place, the tension is taken off at the point where the pedicle is curved, and the flap will sit easily in its new position, and be almost certain to unite, provided the breadth of the pedicle is sufficient to maintain the vitality of the flap. In some cases the method of T. Wharton Jones answers an admirable purpose, making a triangular flap, which is left attached at the base and detached from the subjacent parts at the apex and the sides. This method was originally adopted by T. Wharton Jones in a case of ectropion. In a case of the upper lid the point of the V incision would be upward, and in the lower lid it would be downward. By dissecting up a triangular flap attached at its base, which includes also the part to be replaced in its normal position, the replacement can sometimes be readily accomplished, and the sides of the space from which the flap is taken can be brought together transversely, so as to guard against a returning of the displacement. In that way you give support to the sides of the incision, and you gain all the space between the point of the triangle from which the flap is taken, and the point to which the flap is brought down or brought up as the case may be. That is known as T. Wharton Jones' operation; the V in that way is converted into a Y, when you have simply a line where the sides are brought together, and the inverted V becomes an inverted Y. The adaptations of this mode of operation are very numerous; you will find a great many cases of plastic surgery in which you can avail yourselves of this method of supplying tissues where they are needed.

In the second class of deformities, in which the orifices of the mucous canals are closed, or greatly contracted, simple or multiple incisions may be made, followed by dilatation, the dilatation being continuous or intermittent, according to circumstances. In some canals the wearing of a constant plug will not be well borne; you are obliged, therefore, to dilate from time to time, once or twice a day, or once in two or three days, according to circumstances, but after making free incisions it is important that thorough dilatation should be practiced in order to prevent a re-contraction. This is exemplified in a class of strictures which occur at the orifice of the urethra, for example, from a chancre in that situation. When a close contraction has taken place you have to make free incisions, and it is better to make several incisions in different directions, rather than a single one, and then dilate to a considerable extent; then continue to repeat the dilating process as often as necessary, until all tendency to contraction has been overcome. Half-way measures will not succeed in overcoming these contractions, and the great reason why surgeons have often failed in overcoming cicatricial contractions is that they have not carried the process as far as they ought to do, the incisions have not been sufficiently free, the dilatation has not been carried sufficiently far, or continued sufficiently long.

It has been the general teaching of surgeons that cicatricial contractions of a certain degree of severity could never be overcome; that there would be always a tendency to a recurrence of the contraction, and as far as I know I was the first surgeon who demonstrated that some of the worst cases of cicatricial contractions could be completely overcome to such a degree that there would never after be a return of the contraction; but it requires for this purpose that the work should be very thoroughly done, and that the parts should be so situated as to admit the application of efficient mechanical contrivances to resist the tendency to contract.

In the third class of deformities, in which the features are drawn into abnormal positions, the cicatrices may be freely divided, the features replaced in their normal condition, and the chasm thus produced be filled by means of a triangular flap, substantially as in the first class of deformities mentioned, where there is eversion or separation of the orifices of a mucous canal.

In the fourth class, which is characterized by adhesion of apposed cutaneous surfaces, the treatment consists in the free division of the adhesions, throughout their whole extent, and the application of adhesive plasters or bandages, so as to maintain normal separation of the parts, and by their pressure to restrain the exuberant growth of granulations. You have, for example, a case of webbing of the fingers, from the contraction of a burn. After freely dividing the web as far as the normal commissure or a little beyond it, towards the palm of the hand, each finger is to be separately dressed by strips of adhesive plaster, applied with considerable firmness, securing them above the commissure, and making firm pressure with them, so as to restrain the growth of granulations, each side of the wound being separately dressed in that way and the dressing being frequently repeated, you can to a considerable extent overcome the tendency to the reproduction of the web. You will be apt to be somewhat disappointed as to the completeness of the expected result; you will find after making free incisions and dressing the part thoroughly, in spite of your efforts, the web will be to some degree reproduced, and you will be obliged to repeat the incision and repeat that mode of dressing. It may be assisted sometimes by elastic pressure, that is by having a bracelet applied round the wrist, and an India-rubber band to make a continuous pressure, a pressure which will be continuously felt more decidedly than by simple bandages or adhesive plasters.

In the fifth class of cases, where there is fixation of one or more of the extremities in one position, generally attended with marked deformity, and always involving a serious impairment of function, the cicatricial contractions are to be freely divided throughout their whole breadth and thickness, and in many cases by a number of parallel incisions. Suppose, for instance, there is present a cicatricial band of considerable thickness and density. It is often advantageous, instead of making one incision, and allowing that to gape very widely, to make a number of incisions, so as to cut up the cicatricial surface into small insulated or peninsular masses. When you come to stretch the parts into their normal situation, you will find instead of one very wide chasm, you have a number of small chasms formed, and each portion of the cicatricial tissue, which is left between those incisions, forms a starting point for the growth of new tissue, and it will not have the same tendency to contract as if you divided simply at one part, and then stretched it with a wide chasm between the incisions. To avoid the danger of gangrene, care is to be taken to avoid disturbing the relations of the insulated cicatricial masses from the subjacent tissues, from which they derive their supply of blood. In cases where there has been a considerable loss of substance, where the contractions are very firm and extensive, the success of the treatment depends largely on these multiple incisions. After the division of the cicatricial bands, the parts involved in the abnormal tension are to be freely moved in the opposite direction with sufficient force to break down all opposition. By free division and by forcible stretching, you are to bring the part not simply into its normal position, but beyond the normal position, in the opposite direction. Suitable splints are to be then applied to the affected limb to fix it in the position opposed to the previous one. Thus, if it is in a state of abnormal extension, you fix it in a flexed position; if it is in a state of flexion you fix it in an extended position; you replace abduction by adduction, and *vice versa.* These splints are to be applied in such a manner as to fix the limb in a position opposed to the previous one, the splints being maintained in their place by adhesive plasters and bandages. The splints which I have found most useful for this purpose are composed of felt, stiffened with shellac, and fortified on their distal surfaces with bands of hoop-iron. Here is a splint adapted to the dorsal surface of the forearm and hand, the fingers being widely spread, so as to allow space for the application of the adhesive plaster to each particular finger. This material—which I obtain from Mc Intyre, of Broadway and Eighteenth street, New York City—which has a certain degree of stiffness, but which of itself is not strong enough to give you all the force which you require, is capable of being adapted to the surface of the limb by heat. You may hold it over the fire until it becomes soft and warm, and then you can mould it into shape; you can mould it by the limb itself, or if you have a deformed limb, you must have a limb not deformed to mould it by, or you may have a plaster cast of a healthy limb, or any model by which you can place it in proper shape. You can either heat it by the fire or in hot water. If you use moist heat for the purpose, of course you have to prepare it some time beforehand, so as to have it dry at the time you apply it, so that the adhesive plaster may take better hold. The splint thus prepared is adapted to the surface of the limb. In order to give it greater firmness, I use separate strips of hoop-iron which may be applied on the distal surfaces of the portions of the splint adapted to the hand and fingers, one being applied to each digital division of the splint, extending over the portion of the splint adapted to the hand and forearm to such distance as may be necessary to hold the part securely in position. Each one of these iron bands is fastened to the proper portion of the splint by narrow strips of adhesive plaster wound round it. The advantage of this arrangement is that the felt can be accurately adapted to the shape of the limb, and sufficient firmness may be given by the hoop-iron, which is flexible to such a degree that you can bend it to any shape you want it. If you wish to bend it backwards, you may, to any shape you may desire, and at the same time it is firm enough to resist all tendency to contraction of the tissues; it gives you just the amount of strength you require. Steel would not answer the purpose, because you could not bend it into the shape you want. You will find that one or more of the fingers will require to be bent backwards more than the others, and you can regulate that by means of these bands of hoop-iron. That combination, I think, is better than anything else I know for the purpose. I was formerly in the habit of having my splints for the forearm, hand and fingers made with a thumb-piece, also, but it is very difficult to arrange the thumb-piece in its proper plane; the thumb is not on the same plane as the fingers, and it is an awkward position to stretch it back in that manner. I have found it more convenient to have a separate thumb-piece, a little wider than the thumb, passing up from the dorsal surface of the thumb over the outer surface of the radius. With the iron you give it the proper bend; apply your adhesive plaster, and the thumb is managed as an independent member. I have got along much better in that way than by having the thumb-piece a part of the main splint.

After having made the free incision of the cicatricial bands, and before applying the splints, the wounds should be dressed with lint, smeared with carbolized oil or carbolized vaseline, about two scruples to the ounce; that is about one part of carbolic acid to twelve parts of the oil or vaseline. The first dressing may be left on five or six days, and afterward the intervals may be shortened, and passive motion may be freely employed as the healing process goes on.

At every dressing after the first you move the parts freely, make passive motion, so as to stretch the parts, as the tissues take form. As the tendency to recurrence of the contraction diminishes, the splints may be left off daily for a short time, for an hour or more, active and passive movements being freely employed during the discontinuance of the splint; passive movements made by the surgeon or nurse in attendance, active movements by the patient himself, to use his own muscles, and where you have an intelligent patient to co-operate with you in your effort, you will make much more rapid progress than you otherwise can do. After a time, when the tendency to re-contraction seems to be in a measure overcome, the splints may be discontinued during the day-time, in order that the patient may have the full benefit of exercise, and reapplied at night. The final discontinuance of the splints should not be recommended until all tendency to contraction has been completely overcome. If you find after the splints have been left off for a few hours, that the cicatrices begin to stiffen and show some tendency to contract, that indicates the necessity of persevering with the use of the splints. You will find after a while, after you have left the splints off all day, the parts seem to be quite flexible, the cicatricial contraction shows no tendency to return, and you may leave it off for a night, or two or three days, but whenever you find a tendency to a return of the contraction, that indicates the necessity of renewing the use of the splints.

When there are broad bands of indurated tissue interfering with the free movement of the affected parts after the first division which you have made, or when, after the treatment has been continued some time, you find there is a considerable breadth of indurated tissue, not standing out in prominent ridges, as at the commencement of the treatment, but still offering considerable obstacle to the perfection of the cure, in such cases you will find it very advantageous to make a series of oblique incisions, at a distance of six or eight millimetres from each other, crossing them in the opposite direction, so that the whole of this indurated mass is divided throughout its whole extent to the soft tissues beneath, into a series of quadrilateral figures, which are separated from each other, except at their subjacent surfaces. These lines may intersect each other at right angles or at oblique angles; you will generally find it convenient to make them rhomboidal, and the effect of this configuration is that in the healing process an opportunity is afforded, as these spaces become a little widened by the recession of the parts from each other, for the lateral healing of the wounds and the diminution of the longitudinal tension.

It sometimes happens, when the fingers or toes have been drawn into a flexed position by cicatricial contractions, that partial or complete dislocation, at one or more of the affected articulations, may be the result. In many of these cases resection of the distal end of the proximal bone involved in the luxation will be necessary in order to remove the deformity. That is done by making a free longitudinal incision over the dorsal surface of the affected finger, cutting down to the bone, dividing the skin, the expansion of the extensor tendon and the periosteum, going fairly down to the bone itself, then with a blunt instrument separating the periosteum from the bone, exposing the articular end of the bone, and with cutting forceps taking off a sufficient amount from the distal end of the proximal bone to enable you to bring the finger up into its place. That is an operation I have applied to both fingers and toes in a number of instances, and with happy results, overcoming the deformity, not aiming to secure a very movable joint, but getting a joint with some motion, and substituting a straight finger or toe for a deformed one. You know that a permanently bent finger or toe interferes with wearing gloves or shoes, and is a source of great annoyance to the patient.

When deformities of the extremities, resulting from cicatricial contraction, have been thoroughly and persistently treated by the means which I have indicated, a permanent cure has been the result, all tendency to the recurrence of the contraction having been completely overcome. In one of the worst cases which have come under my observation, more than twenty years have elapsed since the treatment, and the extensive cicatrices have become soft as buckskin, all the movements of the affected hand and fingers being performed with perfect freedom. That was the case of a little girl who was ten months old when she was burned. She was two years old when she came under my care. The hand was bent backward, so as to lie along the dorsal surface of the forearm, and fixed in that position; and when I dissected the hand from the forearm, and brought it into its proper place, there was an enormous chasm, of course, to be filled up by the growth of granulation tissue. I kept it in a forward flexed position, and obliged it to heal in that position. It took about eight months to secure healing, but by forcing it into such a position, and by the full use of passive motion within that period, the tendency to contraction was completely overcome. The whole dorsal surface of the hand and forearm is covered with cicatricial tissue, perfectly soft and pliable, the patient is now a mature woman, and is able to play on musical instruments well with the fingers of that hand, showing a perfect restoration of their movements.

In the sixth class of deformities, resulting from cicatricial contraction, the prominent ridges or cords of tissue may be excised or shaved off, and firm pressure made with adhesive plasters and bandages, to prevent their reproduction. During the healing process escharotics may be applied from time to time as the necessity for their use may be indicated.

As illustrations of the application of these principles of treatment the following cases will serve. One of the earliest, if not the very earliest, which came under my notice, was one in which there was extreme eversion of the lower lid, the result of a severe burn of the face. This case came under my care forty years ago. This was treated by separating the lid near its margin from the parts to which it was adherent, dividing the cicatricial bands, raising it up to its place, and then cutting a flap from the cheek and turning it, so as to fill up the chasm. The result was gratifying. (See *New York Medical Gazette*, January 19th, 1842.)

One of the most remarkable cases of deformity arising from cicatricial contraction affecting the eye-lids occurred in the person of a young lady, who, in some kind of a fit, fell into an open fire, and her face was in contact with the fire long enough to destroy a very large part of the integument. The left upper eye-lid presented an extreme degree of ectropion. The margin of the lid was drawn high up from the forehead, separated as widely as possible from the lower lid. On the right side the same deformity existed in a less degree, but there was marked ectropion and inability to close the lids. The eyebrows were almost entirely destroyed. The treatment of this case required a series of operations running through nearly two years. The first important operation on the left side, where the ectropion was most marked. consisted in the separation of the margin of the upper lid from the cicatricial tissue of the brow, and attaching the free margin of the upper lid to that of the lower by sutures, so as to hold it in place. These sutures were allowed to remain in place a number of days. A large chasm, as wide as my thumb, was left between the eye-lid and the integument above, the integument being very much marred all the way up to the margin of the hairy scalp. This large space, which was left by bringing the margin of the lid down to its place, was filled up by a flap taken from the integument of the temple where it was covered by the hair. The hair was shaved off, the flap was turned around and inserted so as to fill up the space, and it united by the first intention. Here is a very interesting fact connected with the transplantation of this flap. It was taken from a portion of the integument which is supplied with hair, and that hair was afterward used in the formation of the eyebrow. The same operation was performed on the right side where the deformity was less, the flap of the integument being taken from the corresponding part of the right temple. Both these flaps adhered. It was found, after the lapse of a number of months, that there was still too much tension on the side where the greatest deformity had been, and it became necessary to make a division again near the margin of the lid, and to transplant another flap taken from the cheek, so that two flaps were transplanted, one by the side of the other. In the case of the flap which was taken from the temple on the left side, there was so much tension upon the forehead that a parallel incision, to take off the tension, was necessitated. The date of the first operation was December, 1876. For the removal of the different blemishes resulting from this burn, a very considerable number of operations were performed upon the cheek, the margin of the nose, the lip, and other parts. The ultimate result was, not the restoration of the original beauty of the patient, but the removal of all very obvious deformity. Eyebrows, so well formed that an ordinary observer would hardly suspect that they were not the natural eye-brows, have been formed from the hair upon the skin which was transplanted from the temple. Of course, the whole of the flaps being supplied with hair, there was more than was needed for the formation of the eye-brows, so I instructed the patient to pluck out the superfluous hairs from time to time, and provided her with suitable forceps for that purpose. She is thus enabled to give such shape to her eyebrows as she desires, while the pain of plucking the hairs singly is very little.

At the time these artificial eyebrows were formed, I supposed it was entirely an original operation of my own. I found out afterward that many years before an eminent surgeon of Philadelphia, Dr. Pancoast, Sen., had formed eyebrows by transferring a portion of the integument from the hairy scalp.[1] It had never come to the knowledge of the profession at large; was published in some local paper, but not known at that time to the profession. The details of this case, with ample illustrations, were published in the transactions of the American Medical Association for 1878.

There is one thing to be observed with regard to these operations, which I did not allude to before, and that is that it is never safe to attempt to transfer a flap of cicatricial tissue; it almost always sloughs. You may divide it into rhomboidal masses, leaving it attached by its base to the subjacent parts, and it will not slough; but if you attempt to dissect it up from its base, it almost invariably sloughs. Therefore, you must have healthy integument for your flaps. For that cause I was obliged to go so far back towards the temples of this lady from Virginia, to where the temple was covered with hair. It was after the transplantation had taken place that I saw the capabilities of the hairy flap in making eyebrows.

I will refer here to a case of deformity of the nose, though, perhaps, it cannot be called strictly a cicatricial contraction. It was a case of a boy that was kicked by a horse. The boy's nose was broken, and the result was a very much turned-up nose; the point of the nose looking forward and upward, the nose very much shortened and disfigured. This case I treated by separating the distal end of the nose from the upper part by an incision extending from cheek to cheek, bringing the point of the nose down to its place, and then making a flap from the forehead and bringing it down to fill up the chasm. The forehead and nose present the appearance of scars, but the shape of the nose is very much improved. This case was published, with illustrations, in the *Medical Record*, April 26, 1879.

We come now to the cases of the fifth class, which I have spoken of, where we have fixation of portions of the extremities in an abnormal position.

In a case of this class, which came under my care within the last eighteen months, a little girl had her hand drawn into a position in which the fingers were bent at a very considerable angle with the palm, not quite to a right angle, and the index and middle fingers on the palmar surfaces webbed together. It was a case of great rigidity; the hand was fixed in that position, without any ability to straighten it. I treated it by the method which I have indicated, making free multiple division of the constricting bands, and applying a splint of felt and iron, on the same principle as I have shown you. As a result, the fingers became perfectly straight, and the patient enjoyed very good motion in them. A year after the treatment she was having a fair use of her hand, and the fingers were entirely free from deformity.

In the case of a young man who came under my observation at the meeting of the American Medical Association at Richmond, last Spring, both hands had been badly burned, as the result of a gunpowder explosion. The cicatricial contractions resulted in the dislocation of both little fingers, one at the articulation of the first and second phalanges, the other at the second and third, while the thumbs were drawn across the palms of the hands; the distal articulations of the thumbs were thrown backward, not from cicatricial contraction, but because the whole force of the extensor muscles was spent upon the distal ends, which were free. The other phalanges were not free for the extensor muscles to act upon. It would appear from the bending backwards of the thumbs that there might have been some active force bending them in that position, but that was solely the result of the extensor muscles being thwarted in their efforts to bend the first and second phalanges of the thumb, and the whole force was expended upon the third. The thumbs could be bent forward. Several of the fingers besides the little fingers were considerably bent; on one of the hands the index finger and the ring finger were bent, and there were strong cicatricial bands bending them. This patient resided in Kentucky, and before he came to Richmond to see what aid he could find there, had gone to one of our Western cities and consulted some of the leading surgeons there, and they looked upon the case as one that afforded very little prospect of being benefitted by treatment, and intimated they could not do anything for him. He came to Richmond, and was referred to me by the Chairman of the Surgical Section of the Association, Dr. Hunter Mc Guire, and I made arrangements with him to come to New York. He came during the month of June last. He remained at the Presbyterian Hospital until some time towards the close of August. He was a very intelligent patient, and he co-operated in the efforts to restore the position and the mobility of his fingers more than patients usually do, so that the object was accomplished in a much shorter time than usual. It was within three months that this object was accomplished. When he went away he had not arrived at the stage when the splints could be permanently left off with safety, and I advised him to wear them at night, but he was not wearing them during the day, and there was a considerable amount of motion, which was steadily increasing. I have no doubt he will have, not absolutely full motion, but a very useful degree of motion in his fingers. The details of this case, with illustrations, were published in the first number of the *New England Medical Monthly*.

I was consulted several years ago in the case of a little child, from the Eastern end of Long Island, whose hands and face had been very badly burned by falling against a hot stove. The right hand was very much less disfigured than the left. The principal deformity of the right hand consisted in the forcible flexion of the distal end of the thumb across the palm of the hand in such a manner that there was an absolute dislocation of the last phalanx upon the second. The distal extremity of the index finger was abducted and sub-luxated, so as to prevent a very considerable lateral flexion. In this case I was obliged to perform exsection, in the manner I have indicated, of the distal extremity of the middle phalanx of the thumb, and of the second phalanx of the index finger. As a result, I was able to bring the thumb into its normal position, and to improve the position of the finger. It is still a little bent, but very much less than it was, and the hand was quite useful to her after that was accomplished. The other hand was a more remarkable mass of deformity than I ever saw resulting from a burn, where the parts had retained their vitality; the thumb and ring-finger were uninjured, and the patient retained the full power of moving them, but the index, middle and little fingers were joined together in a cicatricial mass of adhesion, so that you could hardly tell to which of the fingers the different points belonged, and the hand was forcibly bent backward very nearly at a right angle with the lower extremity of the forearm. Of course, I was unable to restore this hand so as to make it anything like a perfect hand. I was able, however, after long continued treatment, to overcome completely the backward flexure of the hand upon the forearm, so as to bring it into its normal relation, and, by sacrificing the index finger, to preserve in a somewhat mutilated condition the middle and little finger. The hand which resulted was a very imperfect one, but yet as far as the wrist was concerned, the deformity was entirely overcome. The fingers were very considerably shortened, and did not enjoy a very great degree of motion, but they were nearly straight and in a line with the hand, and, comparing them with their condition before treatment, I consider the result quite a triumph of surgery; a very imperfect hand, but a very different thing from the mere jumbled mass of distorted fingers which it originally presented. Scarcely any case I have ever undertaken gave me more trouble than this, and, although the hand is very imperfect, yet, comparing it with what it was, I think great benefit has been gained, and the parents of the child have been well satisfied with the result. This case was reported, with illustrations, in the Transactions of the American Medical Association for 1879.

I recall next a case of deformity of the hand, resulting from an injury. I hardly know whether to call it a burn; it was a combination of burn and contusion. The hand was caught in some machinery, by which the back of the hand was severely contused, but it was burned at the same time. There was a hot roller connected with the machinery. I don't know what particular kind of machinery it was, but there was actual heat in connection with the contusion, and the result of that was a contraction across the back of the hand, by which the little finger was thrown completely across the dorsal surface of the ring-finger. I made free division of the cicatricial bands binding it in the abnormal position and brought it into place. The result was a perfect restoration. An account of this case was read before the

New York State Medical Society, and published in *New York Medical Gazette*, February 28th, 1880.

I spoke about the uses of T. Wharton Jones' triangular incision, converting a V into a Y. I recall one or two of the applications of that incision in a way which is rather peculiar, that is, acting upon the sound parts a little above the cicatricial parts, upon which I was operating, for the purpose of giving them more integument to draw in as they contracted. I wished to overcome, for instance, the webbing of certain fingers, and there was a want of sound integument in the neighborhood, and before dividing the web I made a triangular flap of the kind described, and forced a portion of integument from above to supply the needs of that part; and, in another case, to overcome the backward contraction of the wrist I performed the same operation, and when the hand was brought down I gained so much in the length as is represented by the recession of the angle from the point from which it was taken in overcoming the backward flexion of the part.

EXTROVERSION OF THE BLADDER THROUGH THE UMBILICUS, WITH OPERATION FOR CURE.

By HENRY N. READ, M.D.,

OF BROOKLYN,

LECTURER ON DISEASES OF CHILDREN AT THE LONG ISLAND COLLEGE HOSPITAL.

THE following case was presented at my clinic last July: A female infant six weeks old was brought to be examined for what was thought to be a rupture. Examination showed a child fairly grown for its age, but much emaciated, presenting at the umbilicus a dark red or purplish colored tumor about the size of a hen's egg, which extended down to the external genitals. The membrane covering had a velvety appearance, and bled on much handling. The tumor was invaginated from its posterior wall, and was returned through the umbilicus with great difficulty after many trials. The umbilical opening was about the size of a 25 cent piece, the edges being hard and well defined, and there was no separation of the recti muscles either above or below the umbilicus, nor any other abnormal appearances than the one described. The bowels were regular and the urine passed normally. The mother stated that the child was born with the deformity, and the attending physician, whom I saw afterward, told me that at birth the tumor projected itself *into the umbilical cord*, the cord being attached to the umbilical opening all around its edges, the vessels passing in at the top. The cord was tied and cut in the usual manner, but came away very shortly. The child screamed incessantly, and was evidently suffering great pain, except when the tumor was returned to the cavity of the abdomen. The surface of the tumor discharged a little mucus, and at times a greenish watery fluid, not unlike fæcal discharges in the infant. The child nursed greedily, and, the mother stated, had been fat at birth, but from constant irritation and screaming day and night, was now much reduced. A finger, passed into the umbilical opening and invaginating the tumor, went down into the pelvis, and rectal exploration with another finger, at the same time, showed no connection with the bowel. Drs. Kretzschmar, Stuart, Rand, Westbrook, and others of the attending staff saw the case, but no positive diagnosis was made, although I recognized mucous membrane and invagination. The tumor being returned to the abdomen, was secured by bringing together flaps of skin over the umbilicus, and holding them in place by several thicknesses of adhesive plaster passed entirely around the body. This treatment was continued for three weeks, and gave the child great relief. She became quiet, slept well, and gained flesh rapidly. The bowels continued to act well, and the urine was voided in normal quantity; but the mother stated that a quantity of water escaped through the umbilicus. On removing the dressing, after three weeks' treatment, the tumor came out suddenly as the child strained, and a quantity of water was discharged upon me. The child at the same time voided urine and screamed violently. The water ejected had a urinary odor and reaction, and for the first time I suspected the tumor to be the bladder extroverted through the umbilicus. I then passed a uterine sound in through the umbilical opening, and, on introducing a silver probe into the urethra up into the bladder, felt the two meet and rub together. This procedure was demonstrated also by several of my confreres, and some students also who were present. The strapping having given such relief, I continued it for three weeks more, till the child was twelve weeks old, when, the patient being in excellent condition, I proceeded to the operation for a radical cure. Though the general improvement of the child was so great, little, if any, change had taken place as regards the deformity, and whenever the straps were removed, unless prevented, the bladder would escape again through the opening. The operation was performed with the assistance of Drs. Westbrook and De La Vergne, and was troublesome rather than difficult. It consisted simply in dissecting up the skin around the internal edges of the umbilical opening, and uniting the surfaces thus freshened with sutures. These attachments of the skin being all turned under, and the opening being puckered in appearance, with many folds in the integument, the dissection was necessarily tedious. By hooking a tenaculum under the folds of the attachment of the skin and everting it, however, the dissecting process was carried down to the junction of the vesical mucous membrane, the bladder in the meantime being held in place by the handle of a large sound. The freshened edges were then brought together with nine horse-hair sutures introduced parallel to the axis of the body. The wound presented then the appearance of a transverse slit across the belly about two inches in length. The whole was firmly secured with adhesive plaster and bandages, and on the fourth day the sutures were removed. Union was found to have taken place along the entire fissure, except at a point in the middle, through which a drop of urine occasionally forced itself. This opening was so small that it was not thought necessary to attempt its closure. The child grew strong and healthy and was well in every respect, except that now and then a little urine escaped at the fistula, which, however, gave no trouble. It lived to be nearly ten months old, when it unfortunately died from an attack of bronchitis, complicated with pulmonary collapse. No post mortem could be obtained.

The case presents several points of interest. This kind of extroversion, I believe, is extremely rare. Many cases are reported of entire or partial absence of the anterior wall of the bladder, with separation of the recti muscles, separation or entire absence of the pubes, but none of the entire organ protruded through the umbilical opening. Skene, Holmes, Erichsen, Gross, Coulson, Harrison, and Van Buren and Keyes, make no mention of a similar case. Vogel alone, of the authorities I have examined, makes mention of this condition, and he, by no means, fully describes it. The cause of this deformity, according to J. Müller, is neither an arrest of development, nor a stopping of the bladder at a former stage of growth, but is a rupture of the sac, which occurs at a time when the abdominal parietes are not completely formed. This rupture has its foundation in a transient or permanent impermeability of the urethra, by which the urine, which accumulates in the bladder, distends it to such an extent that the wall bursts. According to this author, the bladder is not formed in the fœtus through a reflection of a lamina, but merely by the gradual dilatation of the pouch, which, with the urachus, is pinched off from the sinus urogenitalis. But the urachus does not originate through the reflection of a lamina, but is only the neck of the allantois, which primarily grew forward from the intestinal canal like a small vesicle. It is extremely improbable, however, that any stoppage of the urethra existed in this case; certainly no permanent one, and no evidence that a temporary one had ever been present. A more plausible explanation is found in the explanation given by Vrolik (*Archiv für Anat.*, 1867). "If, about this period of gestation—that is, the time of the development of the bladder—

by inflammatory change, or adhesion, or some degenerative process arising from one of those specific diseases to which we know the fœtus in utero to be liable, the normal progress is arrested in the outer abdominal or amniotic layer of the allantois, without affecting the inner or mucous layer, the result at the time of birth would be the formation of *ectopia vesicæ*—that is, a fissure of the hypogastric wall only, with a completed condition of the walls of the bladder itself. But if the morbid process extends also to the subjacent portions of the internal cylinder or *mucous* layer of the allantois, then, according to position and extent of the abnormal change, the result would be a more or less extreme degree of *epispadias*, an open or imperfect urachus, or a completely fissured and extroverted bladder with separation of the pubic bones and other changes associated with this deformity."

The excellent result of the operation in this case is worthy of note. This condition is notoriously difficult to adjust. Steiner and Vogel both regard operations for its relief with but little favor, the former stating that the dribbling away of the urine, renders union of the cut surfaces almost impossible. The latter says that operations for the relief of this deformity usually fail, and the patients drag on miserable lives. The only point which failed to unite was in the centre, much to my surprise, as I thought the ends or corners of the opening would be the most troublesome in getting union. Prof. Skene states that the centre is the most difficult point to get union in. A last point of note was the sex in my case, which it will be observed was a female. About five-sixths of the cases ordinarily occurring are males, according to all authorities.

HÆMARTHROSIS OF THE KNEE, COMPLICATING FRACTURE OF THE PATELLA—SECONDARY HEMORRHAGE INTO THE JOINT—ANTISEPTIC INCISION—DEATH FROM CARBOLIC ACID ABSORPTION.

By GEORGE R. FOWLER, M.D.,
OF BROOKLYN.

ON the afternoon of April 15th, 1882, Mrs. R. M., aged 58, while precipitately descending a flight of stairs, and when within a step or two of the bottom of the stair-case, felt "something snap," immediately following which her limbs gave way under her and she fell. She was conveyed to a couch and was seen by my assistant, Dr. C. D. Beasley, shortly afterward. He states that at that time the left knee-joint was very much distended by fluid. When visited by myself about two hours after the accident the following conditions were noted. There were several bruises about both knee-joints, as if the patient had fallen upon her knees. The left limb was semiflexed, and the anterior portion of the knee-joint was bulged forward in a manner suggestive of a subluxation backwards of the tibia. The joint measured 40 cm., the right or uninjured knee measuring 32 cm. Examination under ether showed the injury to be a transverse fracture of the patella, with a hæmorrhage into the joint.

The patient, although presenting the appearance of a healthy woman for one of her age, gave a history of repeated attacks of angina pectoris; auscultation of the heart showed a weakened systole.

The limb was placed upon an inclined plane, supported by pillows and an evaporating lotion applied to the parts. Reaction was prompt under the use of stimulants, and the patient became very comfortable. After twenty-four hours continual application of the evaporating lotion and cold compresses, Martin's elastic bandage was applied to the joint, two compresses being previously applied, the one above the upper and the other below the lower fragment of the patella; the first few turns of the rubber bandage being placed in such a manner as to retain these in position. A felt splint was applied posteriorly and the limb elevated upon pillows. The effusion into the joint slowly diminished under this treatment until on the seventh day the joint measured 36 cm. I then removed the elastic compression, and, retaining the compresses which seemed to approximate the fragments in position by longitudinal strips of adhesive plaster placed over the anterior femoral and tibial regions, the terminal extremities of these being drawn together by passing one strip through a slit cut transversely in the other, and securing them in place by means of a safety pin. A plaster of Paris dressing was then applied the whole length of the limb. Everything went on well until the third day following the application of this dressing, or the tenth day after the injury, when, after a few hours of a gradually increasing sense of fullness in the joint, intolerable pains occurred, necessitating an immediate removal of the dressing. The joint was found to be again distended to 40 cm. Cold compresses were applied, and upon the day following an attempt was made to aspirate the joint. This was unsuccessful, the needle upon withdrawal being found to be filled with blood clot. On April 30th, the fifteenth day after the reception of the injury the pulse rose to 120, and the temperature to 100°. The joint still measured 40 cm. Chilly sensations were complained of, with considerable pain along the anterior surface of the thigh. After making another attempt to aspirate the joint, it was determined to open the joint, and seek for and ligate the bleeding vessel. This was done, with the strictest Listerian precautions, by a longitudinal incision in the middle line of the anterior surface of the joint. About a half pint of clotted blood was turned out of the joint cavity. The source of the hemorrhage was found to be a *per saltum* stream from the inferior internal articular artery. This vessel had been torn across by the giving way of the accessory band of ligamentous tissue extending from the vastus internus muscle to the head of the tibia. This band had been ruptured, not on a line with the fracture of the patella, which was almost exactly in the centre of that bone, but about 3 cm. lower down. A transverse incision was made, extending towards the inner side of the joint, and the bleeding vessel secured by catgut ligature. A portion of the torn ligamentous tissue was in a sloughing condition, and was dissected away. The joint was then irrigated thoroughly with a 2½ per cent. solution of carbolic acid, and a horse-hair drain placed in position upon either side of the joint. There was not the slightest sign of an attempt at repair of the fracture. The fragments of the broken patella were then drilled and sutured by means of four strands of extra-hardened chromic gut, the external incisions closed by means of horse-hair sutures, and the complete Lister dressings applied. The patient was under ether one hour. After administering a hypodermic injection, consisting of ¼ grain of sulphate of morphia and $\frac{1}{160}$ grain of sulphate of atropia, she was placed in bed. Temperature, 100°; pulse, 100; respiration, 24.

The patient reacted moderately well, and during the first ten hours after the operation remained quite comfortable. Urine was voided several times during the period, which in quantity and general appearance seemed normal. Fourteen hours after the operation, the patient had developed an active delirium. At this time the pulse was 160; temperature 101½°; respiration, 30; pupils slightly contracted; patient responds to questions by a vacant stare. Examination of the dressings and wound showed everything to be aseptic and drainage perfect. In spite of the most vigorous stimulation, the patient continued to sink, became comatose and died thirty-one hours after the operation. During the last seventeen hours of her life, almost total suppression of urine occurred—the total quantity passed during that time being but three drachms, and that of a decidedly brownish green color. A post mortem examination could not be obtained.

The three drachms of urine voided during the period of delirium and coma was sent to Dr. E. H. Bartley, Lecturer upon analytical chemistry in the Long Island College Hospital, who, having examined it for carbolic acid, reports that he found about two grains of this acid in the three drachms.

The especial points of interest in connection with this case are as follows: First, the hæmorrhage into the joint, resulting from the rupture of the internal inferior articular artery—this probably resulted from the fall which occurred after the fracture of the patella, the latter being caused, doubtless, by muscular action. Second, the secondary hæmorrhage upon the tenth day, and that, too, while the limb was immovably held in a plaster of Paris dressing. Third, the commencing constitutional disturbance from the constantly increasing pressure within the joint, and the imperative need, finally, for operative interference. Fourth, the carbolic intoxication and fatal issue resulting therefrom.

HISTORICAL AND BIBLIOGRAPHICAL NOTES.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

XVI.—AURELIUS CORNELIUS CELSUS.

B. C. 25—A. D. 40 (?).

CELSUS describes an operation for stone in the bladder which has ever been famous in the annals of surgery as the Celsian method, being more frequently referred to in such works than any and all other operations of ancient times. It is the earliest account of the mode of performing lithotomy, which we possess. The operation of cutting for stone in the bladder is, however, referred to, but forbidden to be done by surgeons, in the Oath of Hippocrates. The Celsian method is known as "cutting on the gripe," and this mode of operation was followed exclusively for sixteen hundred years, when other methods were introduced, as the reader may see in my sketch of "Germain Colot and other old lithotomists." Chapter

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twenty-six, of book seven, of Celsus, is quite lengthy, and is entirely taken up with an account of this operation; from it I will quote a portion of the directions for the performance of lithotomy.

"A strong and intelligent person, being seated on a high stool, lays hold of the patient in a supine posture, with his back towards him, and his hips being placed on his knees, with his legs drawn backwards; he orders the patient to seize his own hams with his hands, and to draw them towards his body with all his power, and at the same time he secures them in that position. But if the patient be rather powerful, two able men must sit behind him on two contiguous seats; and both their seats and their legs next each other must be tied together to prevent their being drawn apart. Then he is placed on the knees of the two in the same manner, and the one, according as he sits, lays hold of his left leg, and the other of his right, and at the same time the patient himself draws up his hams.

"But whether one or two persons hold him, they are to lean their breasts over his shoulders. Whence it happens that the sinus above the pubes, between the ilia, is rendered free from any wrinkles, and the bladder being compressed into a small space, the stone may be seized more easily. Besides these, two strong persons should be placed, one on each side of the assistants who hold the boy, to prevent either the one or both from giving way.

"Then the physician, having carefully pared his nails, introduces his index and middle fingers of the left hand, first the one gently, afterwards the other into the anus, and places the finger of his right hand lightly on the lower part of the abdomen; lest his fingers on each side at once should press too much on the stone, and injure the bladder. And this must not be done rashly, as in most cases; but so that it may be done with as much safety as possible; for an injury of the bladder produces convulsion, and endangers life.

" First of all the stone must be sought for about the neck of the bladder; and when found there is expelled with very little trouble. For this reason I have already stated that the operation should not be undertaken, unless this were ascertained by its peculiar symptoms. But if it be not there, or if it have receded, the fingers are to be extended to the fundus of the bladder, and the right hand gradually advanced beyond it.

" When the stone is found, as it must necessarily fall into the surgeon's hand, it should be drawn out the more cautiously, lest it being small and smooth it might escape, that is, to avoid irritating the bladder too often. Therefore, the right hand is always to be kept beyond the calculus, and the fingers of the left force it downwards till it come to the neck, into which, if it be oblong, it must be forced so as to come out endwise; if flat, it must come out in a transverse direction; if square, so as to rest on two angles; if it be larger at one end, so that the smaller may pass first. In a round one it is evident from its figure that it is of no consequence, unless it be smoother in one part than in another, then the smooth part should advance first.

" When it has been brought into that position just described, a lunated incision must be made through the integuments immediately over and extending to the neck of the bladder, near the anus, with the horns a little inclined towards the ischia; then a second incision is to be made in a transverse form in the convex part of the wound, so as to open the neck of the bladder freely, that the urethra may be laid open, and the wound should be a little larger than the calculus. For those who dread a fistula, which is termed in this part Koruada by the Greeks, make too small an opening, and are afterwards reduced to the same inconvenience, with still greater danger, because the stone, when it is brought away with force, will make a passage unless it find one; and this is even more pernicious if the shape or asperity of the stone contribute anything to it, whence both an hæmorrhage and convulsions may ensue. But though a person escape these, this fistula will be much larger, when the neck is lacerated, than it would have been if cut.

"The incision being now made, the calculus comes into view, the color of which is not of any consequence. The stone, if small, may be propelled forward from one part and taken by the fingers from another; if of considerable dimensions a crotchet (*uncus*), made expressly for this purpose, is to be introduced to it, and applied to its upper surface. This instrument is thin at its extremity, and beat out in the form of a semicircle, broad and blunt; smooth exteriorly, where it comes in contact with the body; rough on the inside, where it touches the stone.

"This crotchet should be of moderate length, for when short it has not the power of extracting the stone. When it has been introduced, and the stone seized, it should be inclined to each side, that it may appear certain whether the stone be held fast; if it has been grasped, it moves simultaneously with it. And there is a necessity for this, because when the crotchet is being withdrawn, the stone may escape inwards, and then the crotchet might seize on the edges of the wound and lacerate it. The danger incident to this I have just stated above.

"When it is evident that the stone is safely grasped, a triple motion is to be employed almost at the same moment, from side to side, and then outwards, yet so that it may be done gently, and the stone drawn a little at first; this being done, the crotchet (*the handle*) is to be elevated, that it may be further within the bladder, and bring out the stone with greater facility. But if, by chance, the stone should be seized partially superiorly, it should be grasped laterally.

"This, then, is the most simple method of treatment. But a variety of circumstances requires some further observations; for there are some calculi not only rough, but also prickly, which indeed glide into the neck of the bladder, and are extracted without danger. But if they are within the bladder, it is neither safe to seek them nor draw them forwards, because when they wound it, they bring on convulsions and death; and more especially if any point is fixed in the bladder, and throw it into spasmodic wrinkles in the act of extraction.

"Now a stone is discovered to be in the neck of the bladder, by the difficulty of voiding the urine, and that it is spinous when the urine is rendered bloody, and this is particularly to be ascertained by the fingers; neither is the operation to be attempted until this be confirmed. Even then the fingers must be introduced very gently, lest they may wound the bladder by moving it forward violently; then the incision must be made. In this operation many surgeons have made use of the knife. Meges maintains that the knife is inconvenient, because it is too weak, and might encounter some prominence of the stone, and after having dided the flesh above it would not cut where it was concave, which would render a second incision necessary. For this reason he invented a straight instrument with a broad back (*rounded*) at its upper part, and semicircular and sharp at its lower extremity.

"This instrument being held between his fore and middle fingers, and his thumb being placed on it, he pressed it so that he cut whatever part of the stone might be prominent together with the flesh, by which means he succeeded in making a sufficient opening at once. But by whatever method the incision has been effected in the neck, a rough stone ought to be extracted gently; no force ought to be applied for the sake of expedition.

"Now a sandy stone is easily discovered, both before the operation, from the discharge of sandy urine, and in the operation itself; because it makes but a faint resistance to the fingers, and that not equally, and besides it is apt to slide away. Besides urine that brings off with it something resembling small scales, indicates the stone to be soft, and that it is composed of several small ones, loosely held together. All these are to be brought away by alternating the position of the fingers gently, so that they may not injure the bladder, leaving no residuary fragments to impede the subsequent cure. Any of these that come into view must be extracted with the fingers, or by the crotchet.

"But if there be several calculi, they ought to be extracted separately; with this exception, that if any very minute stone remain, it may be better to leave it: for it is difficult to find it in the bladder, and when found, it quickly escapes. Thus the bladder becomes injured by a long search, and mortal inflammations are brought on, insomuch that persons who have not been cut have died from a long and fruitless irritation of the bladder by the fingers. Add to this, that a small stone is subsequently moved forwards by the urine, and then drops out.

"But if at any time the stone is so large that it cannot be extracted, without lacerating the neck of the bladder, it must be split. The author of this invention was Ammonius, who, on that account, obtained the cognomen of Lithotomus, *the stone-cutter*. It is done in this manner: A crotchet is introduced to the calculus so as to hold it fast while being struck, lest it should recoil backwards; then an iron instrument, of moderate thickness, with a thin edge, but not sharp, is to be employed, and being applied to the stone, and struck at the other extremity, splits it, great care being taken that neither the instrument itself, nor any fragment of stone should injure any part.

"Now, these operations are performed in the same manner on females; concerning which a few peculiarities must be mentioned. For in them the scalpel would be superfluous, where the calculus is small; because it is forced by the urine into the neck of the bladder, which is both shorter and more elastic than in the male. Therefore it frequently drops out of itself; but even if it adhere at the farther extremity, which is more contracted, yet it may be extracted without any harm by the above mentioned crotchet. But in larger calculi the same method of treatment will be necessary.

"However, in a virgin the fingers should be introduced per anum as in a male, in a woman per vaginam. Again, in a virgin, the incision must be made below the left lip of the pudendum; but in a married woman between the meatus urinarius and the os pubis, and the incision must be in a transverse direction in both cases. Neither need we be alarmed at a considerable hæmorrhage in a female."

After giving the above minute directions for the performance of lithotomy, he lays down rules, with equal care, for the subsequent treatment of the patient. He advises the careful washing out of the bladder with warm water, by the aid of an "ear-syringe," the use of lint and warm oil; of wool, to protect from cold, and at the same time deprecates the use of poultices, particularly on account of their weight and pressure.

Chapter twenty-seven, of book seven, is entirely devoted to "Gangrene after lithotomy, and the mode of treatment." I have already quoted so much from Celsus on lithotomy that I must refrain from making any more excerpts, however interesting they may be, and content myself with referring the interested reader directly to the work. It will have been observed that Celsus speaks of "the boy," as if men were never operated upon for stone; indeed, in the commencement of the chapter, he expressly states that the operation of lithotomy "is not to be tried at all seasons, nor in every age, nor in every case, but in Spring alone; and only between the ages of nine and fourteen; and also when the case is so urgent that it can neither be overcome by medicines, nor protracted, and that the patient must die if the operation is prolonged. Not but a rash operation now and then succeeds, but because it more frequently fails." He thus expresses his extreme conservatism: "Precipitation in this operation would be incompatible with the danger inseparable from it."

There is no portion of the works of Celsus which can be read without interest and profit. Every chapter deals with some practical problem in medicine or surgery. The eleventh chapter of the second book is entirely on the subject of cupping. This operation was resorted to for direct local depletion, and also as a means of derivation. He describes two kinds of cupping instruments; one for dry, and the other for wet cupping. The *cucurbital* for the former use was made of horn, the large open end having been applied to the body, the air was exhausted through an opening at the small end of the horn, by suction with the mouth, then the little orifice was immediately closed with wax, whereupon adhesion took place. The cup for direct bleeding was made of brass, being open only at one end, into which burning lint was thrown, and its mouth applied to the part which had previously been scarified with a lancet. Celsus tells us that any other material may be employed for making either of these instruments, adding, that if nothing else can be had, a small cup, or a narrow-mouthed pipkin will answer the purpose.

Blood-letting by venesection is treated of very fully in chapter tenth, of book second. This entire chapter is taken up with this subject, and is well worthy of perusal. He tells us that the ancients, (ancients to Celsus), never bled young persons, or pregnant women. That experience had convinced modern practictioners that such precepts were fallacious, that the physician must be governed by the condition of the patient, and by various considerations, which he lays down in detail.

It is very evident that the ligation of blood vessels was practiced in the first century, if, indeed, it was not even then an old operation. In the nineteenth chapter of the seventh book of Celsus, we find the following language. "As many veins" (he often uses the terms, veins and arteries, indiscriminately) "may appear to run in every direction, the smaller ones may be cut off at once, but previous to this, the larger ones are to be tied with a long thread, lest a dangerous hæmorrhage ensue." Farther on we find, "The testicle being now disengaged, is to be brought down gently through the wound itself with its veins, arteries, and spermatic cord: and care must be taken that no blood descend into the scrotum, lest it should coagulate in any part there. This will be prevented, if the physician shall have provided ligatures for tying the veins, and the ends by which their extremities are secured must hang out of the wound; and when suppuration comes on, they will fall out without any pain." There are also other places in his works where the ligation of blood vessels is advised as a means of arresting hæmorrhage. Thus it is seen that many centuries before Ambroise Paré was born the ligature was in common use.

Celsus describes two modes of treating fistula in ano, [Chap. IV., Book VII.]. One method is by ligature, which is to be tightened twice daily, and renewed every third day to prevent its becoming putrid, until the part embraced in the ligature is entirely cut through. This he says, is without pain, the patient being able to be about, as usual. The other mode is for those who are in greater haste to be cured, and consists in the use of the knife. Space will not permit the details given by Celsus.

The method of performing paracentesis abdominis in dropsical persons is given in chapter fifteen of book seven. The place to be punctured is first spoken of, some selecting a point below and to the left of the umbilicus; while others have perforated the navel itself. Some cauterize the skin before making the incision. He cautions against dividing a vessel in making the incision, the instrument must pass through the membrane which bounds the abdominal cavity, "then a leaden or brazen pipe is to be inserted into it, with its lips either curved outward, or surrounded with a ring about the centre, to prevent its slipping into the abdominal cavity. The portion to be introduced should be a little longer than that without, in order that it may pass beyond the inner membrane. By this means the fluid is to be drawn off: and when the major part of it has been discharged, the canula is to be closed with a bit of linen: and this is to be left in the wound, if the opening had not been previously cauterized. Then on the subsequent days about a hemina should be drawn off each time, whilst any trace of water remains. Some even withdraw the canula, although the wound had not been previously cauterized, and bind a wet sponge over the wound: next day they introduce the pipe again, which the recent wound will permit, by being drawn a little apart; so that if any fluid remain, it may be discharged: they are satisfied when this is done twice."

Among the many Celsian operations which the limits of this article will not permit me to describe in detail, I must refer the reader to those for the extraction of weapons out of the body, including arrows and leaden bullets, by means of forceps, and other instruments (B. 7, C. 5). Also to the extraction of teeth with forceps; and of filling the cavities of teeth with lead (B. 7, C. 12). To the extraction of polypi from the nasal cavities (B. 7, C. 10). The extirpation of the tonsils, and of the uvula (B. 7, C. 12). Operations for atresia vaginæ (B. 7, C. 28). Turning in delivery of the fœtus (B. 7, C. 29). Operations for the restoration of parts, including the ears, lips and nose (B. 7, C. 9). Amputation (B. 5, C. 26). Trephining (B. 8, C. 3). The treatment of serpent bites, and of hydrophobia (B. 5, C. 27). The refracture of bones united with much deformity, and also of the rubbing together of the ends of ununited bones, in cases of false joint (B. 8, C. 10).

After such a list of important surgical operations as we here find treated of by Celsus, who in our profession can be so utterly indifferent to the history of our science and art, as not to desire to study the works of the old masters of anatomy and surgery?

It is no easy matter for me to lay down my pen and submit to the stern necessity of limited space; and still more painful is the reflection that I may already have far exceeded the circumscribed limits which the demand for antiquarian medical literature, at the present time, would willingly have allotted to these sketches.

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EDITORIAL DEPARTMENT.

WOLFLER'S OPERATION OF GASTRO-ENTEROSTOMY.

Gastro-enterostomy is the name applied to a new form of operation for the relief of a stenosis of the pylorus, by Dr. A. Wölfler,[1] chief assistant at Prof. Billroth's clinic, at Vienna. We have recently come to look to this clinic, perhaps more than to any other in the world, for suggestions in abdominal surgery. The boldness of its chief operator has been recognized for a long time, and to this boldness is due some of our most recent and best advances in the surgery of the peritoneum. This new operation was undertaken for the relief of distressing symptoms, such as vomiting of nearly all nourishment, and consequent emaciation due to carcinoma of the pylorus. The patient was a man thirty-eight years of age, and at the time of the operation was very weak and greatly emaciated, having for three months vomited nearly everything taken into his stomach. On examination under an anæsthetic, a movable tumor was felt in the region of the pyloric end of the stomach.

The fact that this tumor was movable led the author to make an exploratory incision into the abdominal cavity. After doing so, the pylorus, which was freely movable, was found to be the seat of a carcinoma, which had already become infiltrated into the head of the pancreas, and the hepato-duodenal ligament. While a resection of the pylorus was feasable, under such circumstances, it did not offer a prospect of complete extirpation of the cancer. In order to relieve the patient from his immediate distress, the first thought was to establish a fistula for the purpose of nourishing the patient.

The objections to such an operation were: First, that only the upper part of the duodenum could be selected for the operation without cutting off the bile and pancreatic juice, two very important aids to digestion; and in this case it was undesirable, as it was too near the cancerous deposit. Second, that the patient would still be in a very deplorable condition, as every such patient is.

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[1] *Centralblatt für Chiurgie*, 12, November, 1881, p. 705.

He therefore established a direct communication between the stomach and the small intestine in the following manner: The stomach was opened on its greater curvature, about a finger's breadth above the gastro-colic omentum, by an incision about 5 cm. in length. In the same manner a loop of small intestine was opened on the side opposite to the mesenteric attachment, and the walls of the latter were inserted into the opening in the former, and fastened there by silk sutures. In stitching these walls the modified Lembert's needle was used. The mucous membranes of the two opposing walls were first secured, and afterwards the muscular and serous coats. After thorough disinfection of the whole field of operation with carbolic acid, the abdominal walls were closed up and the wound covered with an iodoform bandage.

During the operation the stomach and the gut to be inserted into it, lay on disinfected sponge. To prevent the escape of the contents of the intestine during the operation, a thick ligature was tied somewhat loosely around it, both above and below the opening. No spray was used, and there was no drainage of the cavity. The wound healed by first intention, and there was no fever. The troublesome vomiting ceased, and the patient took liquid food from day to day in gradually increasing quantities until on the eighth day, when solid food was taken without harm.

Four weeks after the operation, the patient was still improving, and passing solid brown-colored fæces, showing that the action of the bile was not interfered with. On the second of October, 1881, Prof. Billroth performed this operation upon a patient forty-five years of age, for the relief of stenosis of the pylorus, caused by carcinoma of this organ. The disease had already extended far on to the lesser curvature of the stomach and towards the head of the pancreas. The operation went smoothly, and was completed in an hour.

No symptoms of peritonitis, or obstruction of the bowel, as the patient had a passage from time to time. But, on the day after the operation the patient began to vomit bile, which he continued to do until his death, which occurred on the tenth day after the operation. The autopsy showed that there had been perfect union of the walls of the stomach and intestine, and that there had been no peritonitis. The cause of the vomiting of bile was that in drawing up the loop of intestine a spur or fold had formed across it, so as to divide the lumen of the opening into the stomach into two unequal parts ; the larger one towards the duodenal portion, and the smaller towards the descending portion of the gut ; the latter being concealed by the overhanging wall of the stomach, so as to close the outlet from the stomach. The bile and pancreatic juices were thus poured into the stomach, and did not find their way down into the intestine. This case shows the necessity, in future operations, of inserting the loop in such a manner that that portion of the opening in it towards the duodenum shall be partially covered by the overhanging wall of the stomach, while the lower part of the opening or outlet shall remain patent and allow a free exit for the food from the stomach. To insure this result the author advises stitching the upper end of the loop chosen to the under side of the stomach, so as to keep it in that position.

That this operation may be successful in affording proper nourishment to the patient in cases of stenosis of the pylorus, from whatever cause, the results of the first case fully prove. That it leaves the patient with a much better chance for a comfortable existence than external fistula there cannot be the slightest doubt. The difficult task of providing the proper food to introduce through such a fistula is entirely obviated, as neither gastric nor intestinal digestion is interfered with ; and all theoretical notions entertained for the operation were fully substantiated by the results.

The operation does not seem to be either more dangerous or more difficult than that of establishing a fistula, and there seems to be no reason why it is not preferable in all cases requiring the latter ; and in these few an abdominal incision is necessary to confirm the diagnosis before the operation is undertaken, which in itself is a serious operation to most surgeons, and would be performed only in desperate cases. In carcinoma of the pylorus, when the disease has advanced to such a stage as to render the operation necessary, most surgeons would prefer to resort to rectal alimentation for the few weeks or months the patient has to live. Few patients would consent to an operation which could only be of service in demonstrating the capabilities of modern surgery, especially where the chances of a speedy death are as great as in those under consideration. It seems, therefore, that this operation must be reserved for those rare cases of stenosis of the pylorus and upper duodenum, which are of a non-malignant nature, or possibly in some forms of intestinal obstruction.

E. H. BARTLEY.

RECENT SURGICAL EVENTS.

At the Clinical Society of London, Mr. Godlee reported a case of

NEPHRECTOMY FOR CALCULOUS PYELITIS;

the existence of a calculus having been determined by puncturing the kidney with the needle of an aspirator, the operation by abdominal section was performed; although it presented great difficulty on account of the density of the structures surrounding the kidney, the extirpation was accomplished satisfactorily, the patient, a female, aged 57, suffering very little from shock. She died, however, twenty-four hours after the operation, having been in a state of semi-consciousness during the interval; the necropsy showed no lesion of other viscera, and the fatal result was attributed possibly partly to the amount of morphia administered after the operation, or to the carbolic acid absorbed during the operation, although an almost entire suppression of urine was doubtless the most influential factor. Mr. Howard Marsh also reported a case of pyelitis, in which the kidney was explored and removed by lumbar section, death occurring in thirty hours from suppression of urine. He thought the removal of kidneys in persons after thirty years of age was, because of the liability to this accident, one of the most dangerous proceedings in the whole range of legitimate operative surgery; on account of the limited space presented by the loin, experience would show that the method by abdominal section is the preferable operation for removal of large kidneys, or those bound down by firm adhesions.

At the second February meeting of the New York Surgical Society, Dr. George A. Peters read two cases[1] of

OPERATIVE INTERFERENCE IN HYDRONEPHROSIS,

in both of which an opening was made through the lumbar region into the distended sac, and in one case drainage was secured by the introduction of a rubber tube through the wound, the tube being retained for nearly six weeks; in the other, the edges of the opening into the sac were secured by sutures to the edges of the external wound, a sinus being thus established which remained open rather more than a year. In both cases a satisfactory result was obtained. But the author related a third case in which, with praiseworthy candor, he acknowledges an error in diagnosis, concurred in by the staff of the New York Hospital and other surgeons consulted—an enlarged and displaced liver being mistaken for a dropsical kidney. The case is an excellent illustration of the difficulty of diagnosis in these cases—the unanimity of all the surgeons consulted being notable upon the more important points—fluctuation of the tumor being especially remarked.

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[1] *Medical Record*, Vol. xxi, No. 18.

At the first February meeting of the New York Surgical Society, the question of

LAPAROTOMY FOR THE RELIEF OF ACUTE INTESTINAL OBSTRUCTION

came up for consideration, the discussion being introduced by Dr. Sands[1], who related the case of an elderly clergyman who died after suffering ten days from obstruction caused by a gall-stone impacted in the ileum. The ordinary aids to diagnosis were all wanting; the attack was preceded by neither colic nor jaundice, and was unaccompanied by pain, nor did the calculus give any physical sign of its presence in the intestinal canal; manual exploration was impossible, because of the constricted condition of the rectum, but in general the author recommends the procedure at an early period in the attack as being likely to indicate the propriety of early operative interference with the maximum of success. The treatment consisted of opium continuously to allay hiccough, with purgatives and enemata, and the day before his death croton oil was given in the hope of removing a possible fæcal impaction. No cases of successful surgical interference with impacted gall-stones are on record. Dr. Sands also related three cases in which he had performed laparotomy for intestinal obstruction, one only of which recovered; notwithstanding, in many cases of intussusception the operation is an imperative duty, and when performed early will save lives that would inevitably be doomed. He also strongly urges the operation in cases of acute obstruction depending on the reduction of hernia *en masse;* on the presence of foreign bodies that cannot be otherwise removed; or even in cases in which the cause of obstruction is unknown, provided this seems to be invincible and when life must otherwise be sacrificed. Success will be commensurate with the ability to form an early diagnosis of the morbid state, so that the operation may be undertaken before the patient's vitality has been sensibly lowered by the progress of the disease. When the exact nature of the obstruction is not made out, the author would hesitate to entertain an immediate operation because, chiefly, a considerable proportion, even of the most severe of these cases recover spontaneously. In concluding, he submitted three questions to the members of the Society: *First.* What is the result of their experience in the performance of laparotomy for the relief of acute intestinal obstruction? In reply to this question seven cases were related, all terminating fatally. *Second.* What number of such cases had they known to terminate in recovery without operation? Ten cases were presented which had passed on to recovery under the expectant treatment. In connection with the discussion of this question, Dr. Weir believed that, clinically, it was impracticable to draw closely the distinction between acute and chronic obstruction. The good effects of medicinal or expectant treatment are most likely to be attained when the obstacle is situated in the large intestine, the condition of which, as to distention, can readily be ascertained by manual exploration of the rectum. In cases where fæcal vomiting had persisted for twenty-four hours, he would advise such exploration by Simon's method, the decision between the continuation of medicinal treatment and operative interference to be determined by the location of the obstruction thus discovered. *Third.* Should laparotomy be performed at an early period in cases of acute obstruction when no opinion can be formed respecting its character or situation? The author, in discussing this question, thought that caution should be exercised by the surgeon in the early management of these cases, but he should not delay until the patient's vital powers would be so reduced that the chances for the success of an operation must be very slight.

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[1] *Medical Record*, Vol. 21, Nos. 16 and 17.

Dr. George E. Post, of Beirût, Syria, strongly favors[1] the use of

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[1] *Medical Record, loc. cit.*

OPIUM IN ACUTE INTESTINAL OBSTRUCTION

when caused by (1) external strangulated hernia (2) tumefaction of the ileo-cæcal valve (3) invagination of the ileum into the colon, or of one portion of the colon into another. The treatment of the two former has for its object rest of the irritated, congested or inflamed bowel until the irritation shall have subsided, or the congestion or inflammation been subdued, after which the calibre of the bowel is restored, and natural peristalsis clears it of its contents. The *rationale* of the latter is to retain the parts in a quiescent condition until nature may have caused a cure by sloughing of the invaginated portion or by reduction of the invagination. The treatment requires the closest supervision of the medical attendant and his utmost vigilance, lest it should mask symptoms calling for an operation.

Dr. Fenger, of Chicago, reports [1] three cases of

SUPRA-MALLEOLAR OSTEOTOMY

for outward deviation of the foot subsequent to Pott's fracture healed in a bad position. His method is to take out a wedge of bone from the tibia just above the malleolus, sufficient to permit the foot to take its correct position when restored, to drill several holes through the fibula in order to cause it to fracture readily, force the foot into its proper relations, and retain it so with suitable retention apparatus. The operation should be attended with full antiseptic precautions.

At the Royal Medical and Chirurgical Society, Sir Henry Thompson reported a case of successful

REMOVAL OF A FIBROUS TUMOR OF THE MALE BLADDER,

the viscus being opened as in the median operation for lithotomy. In the discussion following the reading of the case, the opinion that tumors of the bladder were not diagnosticated nor removed as frequently as was desirable, prevailed. The author advised that in certain cases of hæmaturia, not clearly vesical and not explicable except by the hypothesis of impacted calculus or vesical tumor, an incision should be made into the membranous urethra from the perineum for the purpose of exploring the bladder. Prostatic outgrowths should not be mistaken for tumors of the bladder; no case of malignant tumor should be operated on; nor should the removal of villous tumors be attempted.

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[1] *Philadelphia Medical News*, Nos. 15 and 16, 1880.

Dr. E. P. Brewster, of Norwich, Conn., has been making[1] some valuable experiments upon the

DURATION OF VITALITY IN THE SKIN,

with reference to the transplantation of grafts from the dead to the living subject, eight of which he details. Of these, five, in all of which the grafts were applied within thirty-six hours of the death of the donor, were successful, not less than fifty per cent. of the grafts surviving; of the remaining three, applied within 38, 40 and 45 hours none were successful.

Drs. F. E. Bundy and W. Ingalls reported to the Surgical Section of the Suffolk District Medical Society[2], a case of

NEPHRO-LITHOTOMY

practiced upon a female, aged thirty-two, who, since receiving a severe blow in the right lumbar region eight years previously, had complained of pains in the region of the right kidney with difficult and painful micturition; the urine contained phosphatic and muco-purulent deposits. After having been under observation for a year—during which time a sinus extending into the kidney and discharging large quantities of pus had been formed—an incision was made upon the director into the abscess cavity, at the bottom of which was found a stone over ten drachms in weight which was removed. A permanent sinus was left from which, at the expiration of eight years, a copious discharge still continues. In other respects the patient's health is fairly good. Dr. M. H. Richardson also reported a case in which a patient, who had long suffered from the formation of calculi, presented a large tumor in the left lumbar region; a similar tumor had appeared three years previously from which a calculus had been discharged. A lumbar section was made into the tumor and, considerable pus having escaped, a stone was removed. The kidney could not be recognized. The patient steadily improved and was discharged three months later, the wound having healed with the exception of a small sinus.

JAMES E. PILCHER.

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[1] *Medical Record.* Vol. 21, No. 18.

[2] *Boston Medical and Surgical Journal,* Vol. 106, No. 21.

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